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Sustainable agriculture

A pathway out of poverty for East Africa's rural poor

Examples from Kenya and Tanzania

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SUSTAINABLE AGRICULTURE

SUSTAINABLE AGRICULTURE

**A PATHWAY OUT OF POVERTY
FOR EAST AFRICA'S RURAL POOR**

EXAMPLES FROM KENYA AND TANZANIA



Sustainet aims to systematically evaluate, communicate and disseminate successful approaches and concepts of sustainable agriculture in selected pilot regions. It works at various levels. Discussion between Sustainet's German NGO project partners on the poverty reduction impacts of different models and strategies, coupled with reflection and assessment in the pilot regions in close cooperation with local partners, contribute to harmonizing implementation strategies. Analysis and discussion of successful and promising dissemination strategies aims to influence funding priorities for agricultural and rural development. The exchange of information and networking between public, civil society and private partners on sustainable land use, as well as capacity building of private and public rural service providers, strengthens advocacy and the delivery potential of change agents.

Sustainet's goals are to:

- Highlight the significance of sustainable agriculture for global food security,
- Identify promising key promotion priorities in rural areas,
- Specify fields of action for agricultural policy, and
- Establish networks between local and international partners, thereby promoting the dissemination of successful concepts.

More information: www.sustainet.org

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Foreword

Josef Sayer¹

WE TEND TO THINK of “sustainability” as having three dimensions: ecological, economic and social. But these three dimensions are not separate: in reality they are intertwined. Plus, sustainability has an international perspective that we must consider.

Acting and behaving according to this concept of sustainability is a global task, and is a key question for humanity. In combating poverty, all three dimensions of sustainability have to be taken into account. In the ecological dimension, conserving a sound environment for future generations is closely related to the fight against poverty. Millennium Development Goal 8 aims at the economic dimension: it calls for a global development partnership which overcomes discrimination between poor and rich countries. Finally, there is a close connection between poverty and the social dimension. If people are starving, their health is at risk – this is especially true for the children of the poor – and combating diseases like HIV/AIDS, malaria or tuberculosis becomes very difficult.

How does Sustainet, as a “lighthouse project” of the German Council for Sustainable Development, meet the task of combating poverty while taking into account the concept of sustainability? A lighthouse project is supposed to have a big political impact. But we know that any project is able to make only a limited contribution to global challenges like combating poverty and assuring food security in rural areas. So, what are the interesting features of Sustainet? It focuses on two crucial aspects:

- On one hand, Sustainet creates awareness of errors in the so-called “Green Revolution”. With the Green Revolution it seemed possible to solve the problem of food insecurity worldwide. But as the principles of sustainability were not taken into account; the Green Revolution failed, and even worse, contributed to the impoverishment of small farmers by trapping them in debt.
- On the other hand, transnational companies pose a similar threat to sustainability through campaigns that promise to abolish hunger through “green gene” technology.

As a reaction to the Green Revolution, development cooperation – above all NGOs and churches – established practices taking into account the criteria of sustainability. Proofs were shown in Africa, Asia and Latin America that it is possible to increase yields by 100% through sustainable agriculture especially for small farmers. Sustainable agriculture actually combats hunger in rural areas and significantly enhances degraded soils.

¹ Member of the German Council for Sustainable Development and Executive Director of Misereor. This Foreword is based on a speech presented at the Annual Conference of the German Council for Sustainable Development, Berlin, September 2005.

How can these experiences and models of “good agricultural practices” be disseminated? Why are such solutions limited to certain areas? What are the preconditions for a successful scaling up, and what factors hamper dissemination? As there are no systematic analyses to answer these questions, the lighthouse project aims to figure out how successful, sustainable approaches assuring food security could be spread. In this way, the project will present a real alternative to “green gene” technology, and will have a strong political impact.

The local approaches analysed by Sustainet deal with soil conservation, upgrading soil fertility, integrated animal husbandry, diversification of cultivated crops, protection of biodiversity, natural pest management, post-harvest improvements, marketing, and strengthening local institutions. These are diverse approaches; they all minimize the consequences of agricultural production but differ in the level of external resources used and in the type of tillage operations.

In conclusion, the main objectives of the lighthouse project are:

- To implement the three intertwined dimensions of sustainability in the field of agriculture in developing countries.
- To show the effectiveness of networks between local and international partners and contribute to the dissemination of successful approaches of sustainable agriculture.
- To make policymakers increasingly aware of the significance of sustainable agriculture for rural economical growth and for fighting poverty.
- To identify promising strategies that should be promoted to meet the Millennium Development Goals and which can result in recommendations for agricultural development.

Sustainet partners in Germany and East Africa

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Federal Ministry of Food, Agriculture and Consumer Protection (BMELV) www.verbraucherministerium.de	Conservation Agriculture – Sustainable Agriculture and Rural Development project (CA-SARD) (p. 66) www.fao.org/SARD/en/sard/754/1458/
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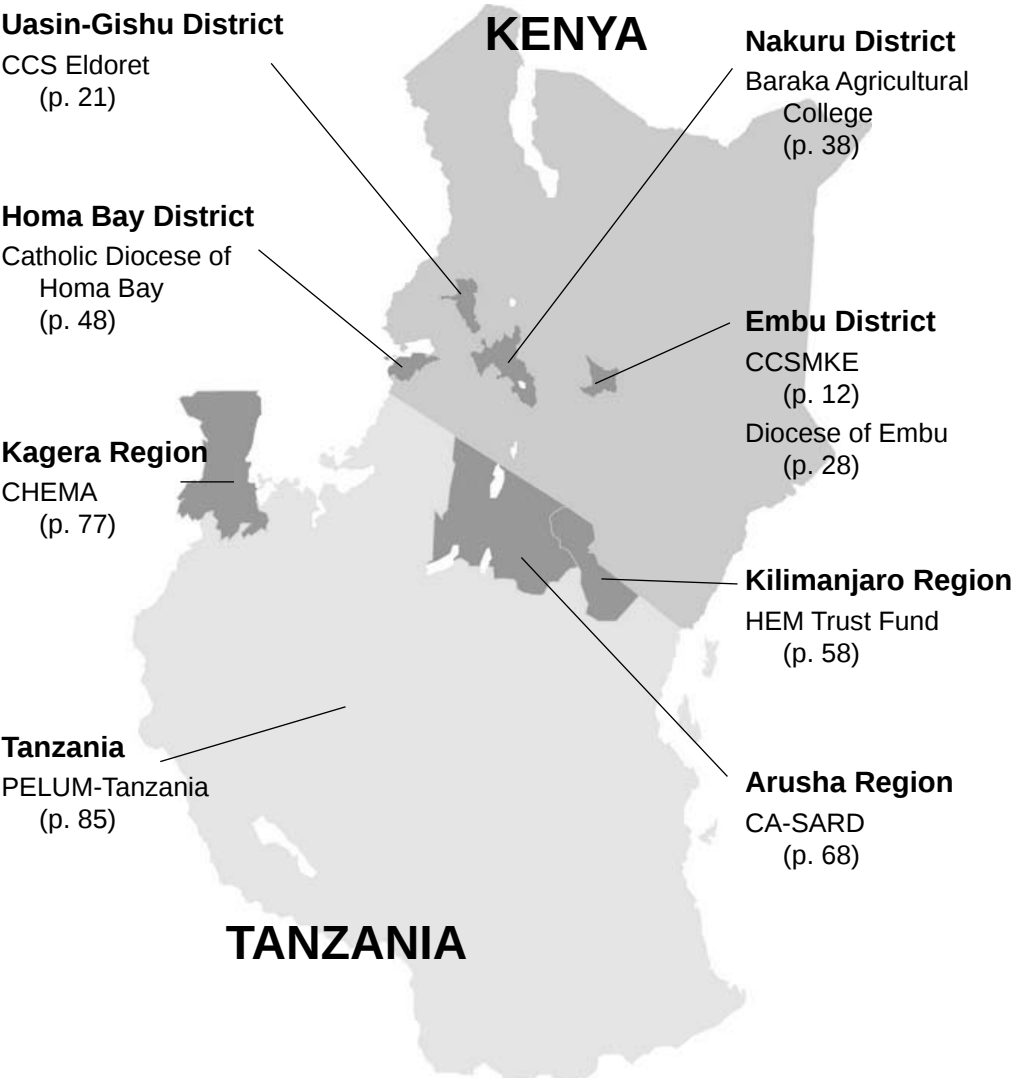
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Locations of projects in this book



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1

Introduction

Helga Stamm-Berg, Sustainet

IN SEPTEMBER 2000, THE largest gathering of world leaders in history agreed to a set of eight goals, the Millennium Development Goals. The first of these pledges the world's governments to eradicate extreme hunger and poverty.

This Goal cannot be realized without agricultural and rural development. The challenges are huge. Sub-Saharan Africa faces serious problems of food insecurity and nutrition-related health risks. According to FAO (1996 and 2000) about 33% of all Africa's population is under-nourished, and the depth of hunger is greatest in sub-Saharan Africa, where the undernourished proportion of the population rose from 37% in 1990 to 45% in 2003. About 70–80% of the people in sub-Saharan Africa live on a less than US\$1 per day. Hungry people can work less, think less, and produce less than those who are well nourished. If present trends continue, the region will have to import rising amounts of grain: 27 million tons in 2020. This rapid growth in imports will put a significant burden on the economies in the region. The food security situation of the poor is forecast to deteriorate further.

As is the case for much of sub-Saharan Africa, food insecurity in Kenya and Tanzania has been increasing (FAO, 2001). Poverty in Kenya is increasing, with 52% of the population living under the poverty datum line. The number of food-poor (who consume less than 2,250 calories per day) has nearly doubled from 7.9 million in 1973 to 15 million in 2002. According to Oxfam UK (2000), the number of undernourished people rose from 23% in 1980 to 50% in 2000. It will be difficult to feed another 10 million people from national production in the coming 10–15 years.

Similarly, poverty has become more common in Tanzania during the 1990s. Half of the population – between 15 and 18 million people – live below the poverty line. Nearly 12.5 million live in abject poverty, spending less than \$0.50 on consumption per day. The proportion of the population who are undernourished rose from 32% in early 1990s to 38% towards the early 2000s.

In both Kenya and Tanzania, poverty and hunger remain predominantly rural phenomena (Oxfam UK, 2000). Moreover, in both countries income inequality has increased. That is, gains from economic progress disproportionately favour urban areas and those who are

Box 1 Millennium Development Goal 1

By 2015, all UN member states have pledged to...

- Reduce by half the proportion of people living on less than a dollar a day
- Reduce by half the proportion of people who suffer from hunger.

already relatively better off, while the rural and the poor are disfavoured. Yet the number of unemployed in urban areas is growing fast, inevitably leading to greater poverty.

When natural disaster strikes, some three-quarters of Tanzania's subsistence farmers are vulnerable to malnutrition. They have too little fertile land, live in areas that are poor for farming, lack capital to invest in improved techniques, and have no alternative sources of income. The situation in Kenya is similar: as a result of the 2000 drought, more than half of the population did not have enough to eat. Production of staple crops was well below average in the northern and central parts of the country; maize production was 69% below expected (FEWS 2000).

The statistics make sobering reading. About 22% of Kenyan and 29% of Tanzanian children under the age of five have been affected by malnutrition. Of every 1000 children born in both Kenya and Tanzania, 78 will not see their first birthday, and 120 die before they reach the age of five. Average life expectancy dropped from 60 in the 1980s to 46 for Kenya and 43 for Tanzania in 2002 (World Bank, 2004) – a drop attributable largely to increased poverty and the ravages of the AIDS epidemic. By comparison, in Germany, a typical developed country, only 4 in every 1000 children die before their first birthday, and life expectancy is 78 years and rising.

The potential of agriculture

How is it possible to meet this challenge? Agriculture has got to be a big part of the answer. It is the most important sector in the economy of both Kenya and Tanzania: it accounts for close to 17% of Kenya's GDP, employs more than 70% of the workforce, and generates about 60% of national export revenue. It is even more important in Tanzania, where farming accounts for about 43% of GDP, produces 56% of export earnings, and employs 70–80% of the workforce (World Bank, 2006).

Because so many people in both countries is rural, the pace of economic development, and success in eradicating poverty, depend largely on growth in the agricultural sector. Farming contributes far less to the national economy than its percentage of the workforce.

But that means agriculture has immense potential (Timmer 1998):

- It can provide adequate and affordable food for a rising population. The process of industrialization and urbanization currently under way in Kenya and Tanzania requires a supply of relatively cheap food for the growing urban labour force.
- Prosperous farmers are a big potential market for domestic industries and services.
- Agriculture provides employment and income to a large percentage of the population. Small improvements in farm productivity and in rural earnings, multiplied by millions of smallholder farmers, can generate huge benefits for the country as a whole.
- Agriculture supplies raw materials to a growing domestic industrial sector.
- It earns valuable foreign exchange that can be used to finance imports of capital and intermediate goods for local development.
- It can be a significant source of domestic savings for investment and capital formation.

Box 2 Agriculture in Kenya and Tanzania

Kenya and Tanzania are large countries. With over 580,000 km², Kenya is about the same size as France, while at 945,000 km², Tanzania is only a little smaller than France, Germany and the Benelux countries combined. Kenya has a population of 32 million, growing by 2.2% a year, while Tanzania has 36 million, increasing by 1.9% a year (World Bank, 2006). Some 58% of Kenya's population live in rural areas, as do 62% of Tanzania's. However, only about 4 million ha in both countries (8% of Kenya and 4% of Tanzania) can be cropped (FAO 2006).

Landholdings

Land sizes vary considerably in Kenya, where it is estimated that less than 20% of the population owns more than half the land. While a few own large tracts, much of this land is never used and is not subjected to tax. Most rural families live off only an acre of land (0.4 ha) – not enough to feed themselves – and about 13% have no land at all. In Tanzania too, smallholders dominate farming. Livestock are an important source of food and income in dry areas.

Smallholder farming enterprises with less than 2 ha dominate the agricultural sectors in both countries. They rely heavily on rainfall (rather than irrigation), family labour, hand tools and animal-drawn implements. A small number of large farms produce for export.

Land quality

Land with the highest potential for crop production also has the highest population densities. In Kenya, the highest potential areas are in the Rift Valley, Central, and Western provinces. Parts of Eastern and Coast provinces of Kenya are economically dynamic, and commercial and export-oriented agro-enterprises operating there have gained valuable experience in producing marketable outputs.

While the irrigation potential in Kenya is about 9% of the total arable land, less than 2% has been used. In Tanzania, the potential is as high as 20% of the total arable area, but only 3.75% is actually irrigated.

Kenya has the most advanced agriculture in East Africa, with a relatively strong research and technology generation and delivery system, and an extensive network of rural infrastructure. Compared with their neighbours, Kenyan farmers use a lot of fertilizers (35 kg/ha on arable land), though this is far below the world average (94 kg/ha). In Tanzania, fertilizer use is very low (7 kg/ha), less than half of the average for Africa (18 kg/ha).

In many parts in both countries, smallholder farmers face steadily declining soil fertility, usually the consequence of population pressure and inappropriate land use. Prolonged dry spells, recurrent drought and erratic weather disrupt farming and livelihoods.

Large parts of both countries suffer from soil degradation, deforestation and desertification. Unsustainable practices such as over-cultivation and overgrazing lead to a decline in land productivity and production. As the population has increased in some areas, farmers have migrated into less favourable regions – to the east of Mount Kenya, for example, and some coastal regions and parts of central Tanzania, where they often use farming methods that work well back home but are unsustainable in their new locations. The result is degradation, falling fertility levels, and wind and water erosion. Livestock herders are deprived of their dry-season and emergency pastures – which have been converted to cropland – so are more vulnerable to the inevitable droughts.

Commodities

Agricultural products include coffee, sisal, tea, cotton, tobacco, cloves, maize, wheat, cassava, banana, fruits and vegetables. Crops such as maize, rice, wheat and legumes are cultivated for subsistence and to meet domestic demand. Maize is the main staple food crop, despite

Continued...

Box 2 (continued)

the increasing popularity of wheat and rice in the cities. Subsistence farmers grow sorghum, millet, pulses (beans and peas), roots and tubers (cassava, sweet potatoes, Irish potatoes and yams) mainly for home consumption (Dorsey, 1999; Mukibi et al. 2002).

Traditional exports such as coffee, cotton and tea still account for the bulk of agricultural exports. Nonetheless, Kenya has been making significant efforts to diversify exports in such products as fish, vegetables, fruit and flowers, mostly destined for Europe. In addition, Kenya produces oilseeds and sisal for export; and maize and beans to export to regional markets (Dorsey, 1999). Kenyan small and medium-scale farming enterprises have shown they are capable of serving domestic and export markets. Kenya started these non-traditional exports much earlier than other countries in the region.

Tanzania's tea and cotton exports have revived recently. The increase in cotton production is attributed to a number of factors, including the incentives to farmers resulting from competitive markets, improved supplies of inputs to cotton farmers by traders and ginneries, and acreage expansion. Although Tanzania is far behind Kenya, it also grows a variety of other crops for export: cashew, tobacco, sisal and cloves, together with flowers, fruit and vegetables (Ndulu et al. 1998).

Many industries in the two countries process agricultural products. Particularly in Kenya, such industries are promising starting points for higher demand for smallholders' products. Farmers are traditionally prepared to engage in self-help and cooperation in such enterprises.

There is considerable historical evidence that solid agricultural growth has to precede, or at least accompany, general economic growth. This transformation process still applies today; Africa will not be an exception, and it will not be able to jump this vital step. A broadly accepted conceptual framework for agricultural and economic transformation identifies four stages (Mellor, 1986):

- In the first stage, agriculture is nurtured and starts growing, creating new wealth at a rate that allows direct and indirect taxation. This enables investment in other major public assets, including infrastructure.
- In the second stage, agricultural growth becomes a direct contributor to overall economic growth through greater links with industry, improving efficiency of product and factor markets, and continued mobilization of rural resources (labour, raw materials and capital).
- In the third stage, agriculture is fully integrated into the market economy. Prices of food and the share of food in urban budgets continue to decline.
- In the fourth stage, agriculture is part of an industrial economy.

As agriculture passes through these stages, its share of gross national product diminishes, and the population becomes more urbanized.

Unfortunately, some policy makers have misinterpreted this trend. They see a decline in the relative importance of agriculture as meaning that agriculture is economically less important in the development strategy. In reality, agriculture is politically alive, including in industrial economies where farmers and the rural population represent only about 4% of the total population, but still command the attention of governments and of financial and industrial interests. Even where farming's relative importance in the economy has declined, growth in agriculture stimulates growth in other sectors, so has a significant positive impact on national

income. Moreover, increased public and private investment into the rural economy has a strong multiplier effect: it produces jobs, cuts poverty and boosts economic growth, as in fast-growing East and Southeast Asian countries (Timmer 1998).

Africa, it would appear, is still entering the first of the four stages of agricultural transformation. The continent has to get its agriculture moving, and focus squarely on productivity and competitiveness. Over the last three decades, production increases have been largely through expansion of the cultivated area cropped, rather than through improvements in yield. But in many high-potential areas, farms are now very small, and the only way to boost output is to raise productivity.

Why sustainable agriculture?

The yields on many farms in Kenya and Tanzania have declined. The reasons for this are manifold: the soil fertility is falling because of monocropping with maize and other staples; farmers are no longer able to afford inputs such as fertilizer and seeds after subsidies were withdrawn during the policy reforms of the last decades (see page 95); and a series of droughts has cut production.

Sustainable agriculture offers solutions to these problems.

- **Improved soil fertility** Conventional farming methods rely on artificial fertilizers to maintain fertility. Sustainable agriculture uses a range of techniques to maintain and improve soil fertility: organic fertilizers, mulching, cover crops, agroforestry, crop rotation and multiple cropping.

Box 3 Definition of sustainable agriculture

At the 1992 Earth Summit in Rio de Janeiro, the UN Food and Agriculture Organization (FAO) defined “sustainable agriculture and rural development” as follows:

“Sustainable development is the management and conservation of the natural resource base and the orientation of technological and institutional change in such a manner as to ensure the attainment and continued satisfaction of human needs for present and future generations. Such sustainable development (in the agriculture, forestry, and fisheries sectors) conserves land, water, plant and animal genetic resources, is environmentally non-degrading, technically appropriate, economically viable and socially acceptable’ (FAO 1989).

In 1995 FAO went on to define sustainable agriculture and rural development more specifically as a process that meets the following criteria:

- Ensures that the basic nutritional requirements of present and future generations, qualitatively and quantitatively, are met while providing a number of other agricultural products.
- Provides durable employment, sufficient income, and decent living and working conditions for all those engaged in agricultural production.
- Maintains and, where possible, enhances the productive capacity of the natural resource base as a whole, and the regenerative capacity of renewable resources, without disrupting the functioning of basic ecological cycles and natural balances, destroying the socio-cultural attributes of rural communities, or causing contamination of the environment and
- Reduces the vulnerability of the agricultural sector to adverse natural and socio-economic factors and other risks, and strengthens self-reliance” (FAO 2002).

- **Better pest control** Conventional farming uses chemical pesticides to control pests. These are expensive and often result in the emergence of new pests or the resurgence of the very pests they are trying to control. Sustainable agriculture instead uses integrated pest management approaches: a combination of natural enemies, crop rotations and mixtures and biological control methods. These methods cost less than the pesticides, and do not result in pest resurgence.
- **Controlling erosion** Sustainable agriculture includes a palette of techniques to conserve precious topsoil and prevent it from being washed or blown away. These include using contour bunds, contour planting, checkdams, gully plugs, and maintaining cover crops or mulch to protect the soil from heavy rainfall.
- **Water conservation** Water is scarce in much of Kenya and Tanzania, and drought is never far away. Sustainable agriculture conserves water in the soil through a variety of methods. Fortunately, many of these are the same as those used to control soil erosion. Because it conserves water and uses a variety of crops instead of just one, sustainable agriculture is less risky than conventional monocropping: it is more likely to produce food for the farm family even during a drought.
- **Reliance on local inputs** Farmers often do not realize the value of the inputs they have immediately to hand. They include manure from their animals (which very often is wasted in conventional systems), vegetation from roadsides and the field boundaries (used as mulch or to make compost), and local varieties of crops (many of which are ideally adapted to local conditions but which have been half-forgotten in the rush to adopt modern varieties).
- **Indigenous knowledge** An important local input is the people's own knowledge. Local people are experts on the plants, animals, soils and ecosystems they are surrounded by and on which they depend. Instead of pooh-pooing this as superstitious nonsense, sustainable agriculture draws on this wealth of knowledge, and encourages local people to use it, test it, and promote what works.
- **Local organizations and initiative** Equally important are the energy and capacity of local people to organize and cooperate to solve their own problems. Unlike conventional extension agencies, organizations that promote sustainable agriculture spend at least as much time in helping farmers organize as they do in teaching farming technologies.

Ironically, many sustainable agriculture approaches are very similar to the techniques traditionally used by farmers before the advent of “modern” farming. That does not mean, though, that sustainable agriculture turns its back on modern inputs or ideas. Many types of sustainable agriculture use modern high-yielding crop varieties and artificial fertilizers wherever appropriate. (Some, such as organic agriculture (see page 77) avoid such inputs as well.)

The Sustainet project

Combating world hunger through sustainable, adapted agriculture is one of the main goals of the German government's Programme of Action 2015. To help achieve this goal, a supra-regional joint venture among German development cooperation organizations was initiated in December 2003 by the government's Sustainability Council. The core idea behind this project, called “Sustainet”, is to demonstrate the benefits, viability and widespread applicability

of sustainable, locally adapted land use as a strategic way to overcome hunger and poverty in the developing world.

Three major non-governmental development organizations – Bread for the World, German Agro-Action and Misereor – along with the German Agency for Technical Cooperation (GTZ) participate as equal partners in the joint venture. From May 2006, World Vision Germany is also participating in Sustainet. At an international level, Sustainet cooperates closely with FAO, in particular with the Sustainable Agriculture and Rural Development Initiative and the Conservation Agriculture project. The programme secretariat, based at GTZ in Eschborn, near Frankfurt, manages coordination and networking activities. The programme is funded by the German Ministry of Economic Co-operation and is advised by the German Ministry of Consumer Protection, Food and Agriculture.

Sustainet is an acronym for “Sustainable Agriculture Information Network”. As the name suggests, the programme aims to establish networks between institutions involved at local, regional and international levels. Although various good examples of sustainable agriculture were developed with the assistance of German development agencies and their partner organizations, hardly any analyses on the possibilities of scaling up such successful concepts have been published. In response, Sustainet aims to systematically evaluate and communicate “good agricultural practices”: successful local to international approaches and strategies in sustainable agriculture. This will lead to a better understanding of the fostering and hampering factors relevant for the dissemination of sustainable agriculture models, identify locally adapted agriculture, define promising key priorities for promotion, and specify fields of action for agricultural policy.

Sustainet’s objectives go beyond analysis and evaluation: it also aims to promote the process of scaling up itself.

Sustainet concentrates on three pilot areas: Kenya and Tanzania (the focus of this book), India, and Latin America (Peru and Bolivia). In each of these pilot areas, a number of projects were selected that have been especially successful. Among them are projects that apply the techniques of organic farming, integrated pest management, linking small farmers to markets, public-private partnerships, dryland agriculture, watershed management, protection of biodiversity and post-harvest improvement.

Sustainet has various audiences. It aims to help the local cooperating organizations to learn from each other. Through them, it hopes to help the poor rural population in the pilot regions. It also aims to contribute to political discussion on a national and international level. Through promotional activities and meetings, it highlights the significance of sustainable agriculture for the global food security to political institutions in the pilot countries and in Germany.

The Sustainet process

During the initial project phase (December 2003 to November 2006), Sustainet covers three main activities: (1) systematically analysing successful examples of sustainable agriculture, (2) evaluating and documenting the impacts of local projects, and (3) determining possibilities for disseminating best practices.

To document established and tested good practices, Sustainet selected partners in the pilot areas which have been running successful projects for at least 5–10 years. These partners were chosen by the Sustainet steering group from a list drawn up by a team of consultants. Through regional workshops, Sustainet familiarized the local partners with the project idea and discussed future working relationships. Interested partners were then invited to join the Sustainet activities. They agreed to undergo a self-assessment process and prepare a report of a selected “good agricultural practices”. Sustainet promised to promote and publish their experiences (this book is one of these outputs).

Sustainet has established international information networks and communication structures on sustainable agriculture. To document the selected projects in a way that makes it possible to compare and assess them (and so evaluate their potential for scaling up), the Centre for Advanced Training in Rural Development (SLE) at Humboldt University, Berlin, developed self-assessment guidelines in cooperation with the local partners. This self-assessment generated information on the techniques used (both on- and off-farm), the project approach, the outside support provided, external conditions (local and national) and dissemination strategies. Sustainet guided and assisted the local partners during the self-assessment process.

The Leibniz Centre for Agricultural Landscape Research (ZALF) is analysing the data collected through the self-assessment, with funding from the German Federal Ministry of Consumer Protection, Food and Agriculture. The analysis pays particular attention to the degree to which local people have adopted the sustainable agriculture approaches after the end of the project, and how many people not directly linked to the project have copied them spontaneously. This assessment and analysis exercise will also estimate the impact of the improved practices on poverty reduction and on food and nutrition security.

The evaluation will generate information on factors that foster and hamper the dissemination of the approaches. This will enable Sustainet to identify factors relevant for successful scaling up of good practices. The results, case study reports and lessons will be published.

An important aim of Sustainet is to exchange experience and promote strategic dialogue with key actors in partner countries and among German and international development agencies. This dialogue aims to generate recommendations for future agricultural funding strategies.

How this book was prepared

This book was prepared through a 10-day “writeshop” – an intensive, participatory workshop in which participants wrote, presented and revised the manuscripts that form the various chapters of the book. The participants (see page xiv) came from nine Sustainet partners throughout Kenya and Tanzania, Sustainet-Germany, the Leibniz Centre for Agricultural Landscape Research (ZALF), and the African Conservation Tillage Network. They were supported by a facilitator, artists, an editor and logistics staff. Before the writeshop, participants prepared manuscripts describing their project, following a set of guidelines provided.

During the writeshop, each participant presented his or her draft manuscript. The other participants commented, critiqued, asked questions, and suggested revisions. After each presentation, the presenter discussed the manuscript with an editor (the chief editor or one of the Sustainet-Germany staff), and they incorporated the audience’s comments and together restructured the manuscript so it would fit in the book. An artist drew illustrations

to accompany the text. Meanwhile, other participants were also presenting their manuscripts to the group. Each author worked in turn with the team of editors and artists to revise and illustrate the text.

Each participant then presented his or her revised draft to the group a second time. Again, the audience critiqued it and suggested revisions. After the presentation, the editor, artist and desktop-publishing specialist again revised the manuscript and developed a third draft. Towards the end of the writeshop, the third drafts of some manuscripts were made available to participants for final comments and revisions. These manuscripts form Parts 2 and 3 of this book.

At several stages during the writeshop, small groups of participants discussed policy issues relating to sustainable agriculture, and the constraints, potentials and actions needed to ensure that sustainable agriculture could be scaled up successfully in East Africa. Each group then presented its findings to the plenary for further discussion. The results of these discussions form Parts 4 and 5.

Through this process, individual manuscripts were revised substantially, and the information they contained was combined with ideas from other sources and was distributed throughout the toolkit. A single section in the book may contain information provided by many different participants. This means it is not possible to label a particular section as the work of a particular participant. The “authors” of the book are thus the participants listed on page xiv.

The writeshop process was developed by the International Institute of Rural Reconstruction (IIRR, www.iirr.org), which has used it to produce extension and information materials on a wide range of subjects. Senior IIRR staff members facilitated the writeshop for Sustainet.

Structure of this book

The remainder of this book consists of five Parts.

Part 2, Cases from Kenya, provides examples from five sustainable agriculture development initiatives implemented by Sustainet partners in Kenya, covering maize production, agroforestry, goat-raising, integrated agriculture, and groundnut production. Each example describes the initiative, its results and impacts, and draws lessons from it that can be applied to other projects elsewhere.

Part 3, Cases from Tanzania, tells the story of four initiatives in Tanzania: soil and water conservation, farmer field schools, organic pineapple growing, and networking.

Part 4, Agricultural policy in Kenya and Tanzania, outlines the recent history of agricultural policy reforms in the two countries, identifies problems or issues that remain to be resolved, and suggests how sustainable agriculture can provide solutions to these problems. For each issue, it also suggests policy reforms that could help sustainable agricultural approaches to succeed.

Part 5, Scaling up, tackles the problem of scaling up sustainable agricultural approaches. Parts 2 and 3 have shown that these approaches can improve the livelihoods of smallholder farmers and village communities in East Africa, sometimes dramatically so. But how can these approaches be scaled up to reach a much larger number of people? Part 5 draws on the experiences in the previous chapters to show how it might be done. It divides scaling up into

four types; quantitative, functional, political and organizational, and shows how the Sustainet partners have scaled up their activities in each of these ways. This Part should provide a rich vein for other organizations wishing to expand the impact of their work, as well as for government and donors seeking to stimulate large-scale rural development.

Finally, **Part 6, Participants' profiles**, provides contact addresses and profiles of the people who helped compile this book.

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2

Cases from Kenya

Nine-seeded hole in Ena village

CCSMKE, Kenya

From agroforestry to improved livelihoods in Chebarus village

Christian Community Services, Kenya

Dairy goats: Hope for farmers in Embu and Mbeere districts

Diocese of Embu, Kenya

A tale of two villages: Integrated agriculture in Lare Division

Baraka Agricultural College, Kenya

Days of hunger are gone: Groundnuts in Kuna village

Catholic Diocese of Homa Bay, Kenya

Nine-seeded hole in Ena village

Christian Community Services of Mount Kenya East, Kenya



LYDIA KARIMI USED TO grow maize and beans on her one acre (0.4 ha) of land in the village of Ena, in Runyenje's Division, Embu District. Lydia and her neighbours complained of low yields: like in much of Eastern Kenya, the soil in the village is infertile, and frequent drought meant the farmers sometimes could not harvest anything at all. Lydia had to do all the farm work by herself: her husband worked as a casual labourer in town to earn money to support their two children. The young couple found it very difficult to make ends meet.

Then Lydia heard from the local priest and the village chief that a development organization was going to start work in the area. The organization was the Christian Community Services of Mount Kenya East (CCSMKE), the development arm of the local Anglican Church. CCSMKE conducted a participatory appraisal in Ena and held meetings with the villagers to discuss development issues. Lydia took part in these activities. One thing led to another: she attended training about development issues, and decided to join a new agricultural development group being formed in the village with CCSMKE advice.

Lydia was one of the most active members of the group, so CCSMKE invited her to attend a 3-day training at Macumo Station in August 2004. There she learned many farming techniques: how to make compost, liquid manure and natural pesticides from plants; how to prevent erosion, conserve water and manage soil fertility; how to grow vegetables; and how to select seed of various crops.

One of the subjects in the course was the "nine-seeded hole". This is a way to improve the soil's fertility and its ability to hold water, so increasing yields of crops such as maize, sunflower and sorghum.

Lydia was interested in this method, so she decided to try it out on a small part of her land – about one-eighth of an acre (0.05 ha). She made some compost from the dung and stable litter from her two cows. With some help from a labourer, she dug rows of holes – about 150 of them (see Box 4). She planted the field in the 2005 short rainy season. Instead of using seed she had saved herself, she bought some from a shop in the village and sowed it in the holes. In between the rows of maize, she planted sweet potato vines from CCSMKE, along with beans and bananas.

To her delight, Lydia was able to harvest 90 kg of maize from the plot – over four times more than usual – even though the rains that season were not good. She was able to sell some of the maize and sweet potatoes in the local market. The sweet potatoes, beans and bananas provided some welcome variety to the family's diet.

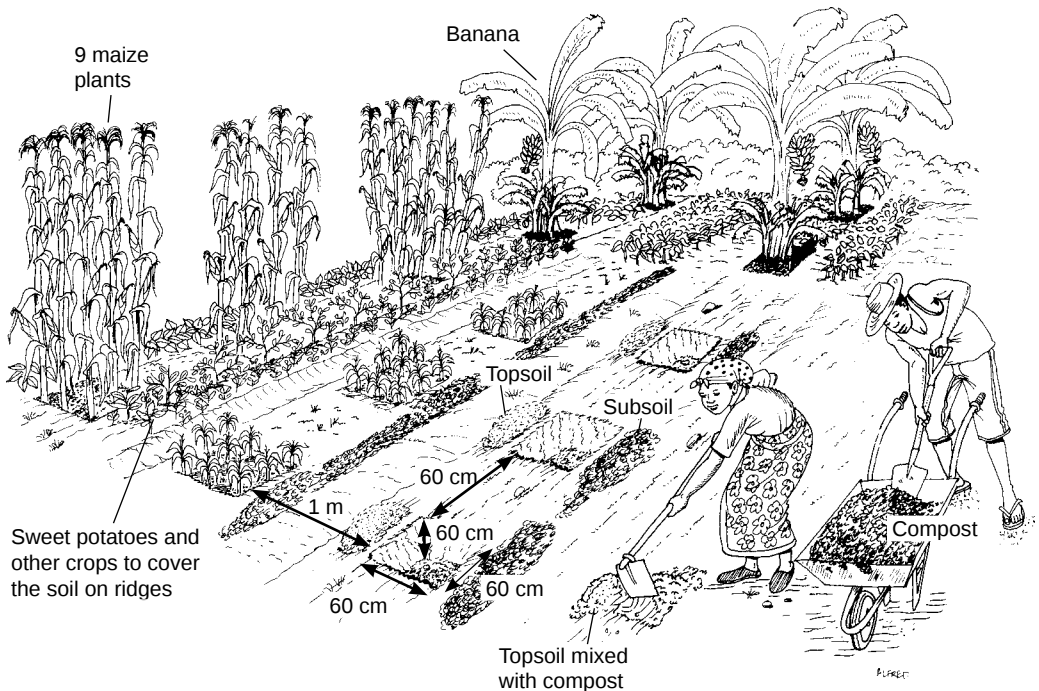


Figure 1 Nine-seeded holes

Lydia was so pleased that in 2006, she decided to use the nine-seeded hole technique on her whole farm. It took 6 days to dig all the holes, and another 3 to carry compost into the field and put it in the holes. It was backbreaking work, but Lydia and her husband decided to invest some of their scanty savings to hire a labourer to help.

Lydia is confident that it will be worth it. She is looking forward to a bumper crop when they harvest their maize in June 2006.

Box 4 How to use nine-seeded holes

Use a hoe to dig a row of holes in the field. Make each hole 2 feet square and 2 feet deep (60 x 60 x 60 cm). When you are digging, take the topsoil out and put it to one side. Use the subsoil to make a ridge downslope from the hole (it will help stop erosion).

Space the holes about 2 feet (60 cm) apart within the row. Leave 3 feet (1 m) between rows of holes. Line the rows along the contour to help prevent erosion.

Mix the topsoil from each hole with about 20 kg of compost made from dung, stable litter and green vegetation. Then put it back in the hole, leaving a depression which catches rainwater.

Sows nine seeds of maize (or sunflower or sorghum) in the hole, in a square pattern with 1 foot (30 cm) between the seeds.

Plant crops such as sweet potatoes, amaranths, pulses, pumpkins and *sukuma wiki* (kale) on the ridges. These cover the soil between the rows well, protecting it from the heavy rain, smothering weeds, and helping control erosion.

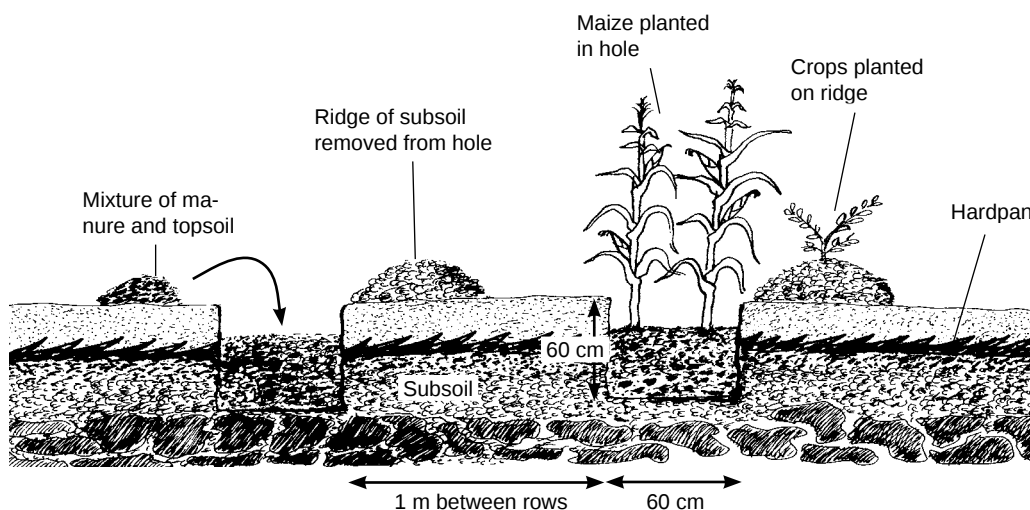


Figure 2 Cross-section of a nine-seeded hole field

Higher yields from nine-seeded holes

The nine-seeded hole method improves yields in many ways:

- **Improved soil nutrient levels** The compost adds organic matter to the soil, which raises the soil fertility. The nutrients are concentrated where the crops can use it – close to the crop roots.
- **Water harvesting and retention** The holes collect water and give it time to seep into the soil. The spongy compost holds the water in the soil so it can support the crops while they are growing, even during a drought.
- **Improved soil structure** Many soils have a hardpan below the surface, caused either naturally or by repeated ploughing to the same depth. This hardpan prevents water from percolating downwards in the soil (so it runs off instead, causing erosion, and the soil dries out quickly during a dry spell). The hardpan also prevents the crop roots from reaching down to the nutrients deeper in the soil. The holes are deep enough to break through the hardpan, allow both water and roots to penetrate deeper.
- **Improved soil protection** Cover crops such as sweet potatoes and beans protect the soil from the sun and heavy rain, and prevent it from being washed or blown away. The soil surface is moister and temperatures are more even, making it easier for earthworms and other soil life to grow, make food for plants, and aerate the soil. Residue from the cover crops can be used as mulch and add nutrients to the soil, and legumes such as beans fix nitrogen that cereals can use.
- **Better control of pests and diseases** In a monocropped field of maize, it is easy for pests and diseases to multiply and attack the crop. A monocrop also encourages certain types of weeds. Growing a mix of crops in the field, as in the nine-seeded hole technique, controls weeds and pests, encourages spiders and other predators that feed on pests. Crops sown in the fertile holes grow stronger and healthier, so are better able to resist pest and disease attacks.

Other benefits

- **Improved productivity and crop diversity** More types of crops and greater cropping intensity increases the total output from the field. The farmer can harvest various types of produce, improving his or her family's diet, leaving more to sell, and spreading the risk of one crop failing. A cost-benefit analysis in Nthagaiya village in Embu district found that the nine-seeded with hybrid seeds improved income from one acre of maize from KSh 5,888 (without the technology) to KSh 19,920 a year (an increase from €167 to €567 per hectare).
- **Easy to understand** The nine-seeded hole method is easy to understand and does not require a lot of technical skills.
- **Improves land use efficiency** The technology increases the number and diversity of crops. It is a good way to use small plots efficiently.
- **Saves labour in the long run** Digging the holes is hard work, but the job can be spread out over several months during the dry season. The holes have to be dug only once; they can then be used for at least 3 years without re-digging. The farmer just needs to add a little compost to each hole to replace the nutrients used up by the previous crop. Then he or she sows the seeds in the same holes. Ploughing would be easier than digging holes to begin with, but has to be done at the beginning of every planting season, so needs more work in total. It also normally leads to the formation of a hardpan.
- **Involves men in farm work** Because the nine-seeded hole method produces good yields, men are stimulated to return to farming, rather than trying their luck in the cities. That in turn reduces the burden of farm labour on the women. The surplus is sold by either women or men on the market. Before CCSMKE started work in the area, only men had money. Today, after CCSMKE had given some training to create awareness, women can spend the family income, and men share their incomes with their families.
- **Reduces dependence on agrochemicals** Using compost means that farmers do not have to buy expensive artificial fertilizers to maintain their yields. They can reduce the use of toxic pesticides by using biological pest control methods, such as soil and ash dust to control maize stalkborer. They need less herbicides and artificial fertilizers because the mulch smothers weeds and compost provides nutrients. Many farmers grow organic food using this technology.
- **Other options for extra income** The nine-seeded hole technique can be used for other crops too. For example, Lydia and her neighbours are growing Napier grass instead of maize in some of their holes to feed to their livestock. They also plant bananas and mangoes in larger holes, 4 ft (120 cm) across and 3 ft (1 m) deep that collect more water. They use more manure for the trees.
- **Easily adapted to difficult soils** Nine-seeded holes in their original form are not suitable everywhere. For example, they may result in waterlogging on black cotton soils. On sandy soils where the topsoil has been eroded away, the remaining subsoil may be too hard to dig. Under such conditions farmers can easily modify the technology by making ridges from topsoil mixed with manure, on which they plant the rows of crops. The furrows collect water and prevent the roots from waterlogging.

Challenges of nine-seeded holes technology

- **High initial labour input** As Lydia found out, it is a lot of work to dig so many deep holes. That discourages many farmers, especially older people who cannot do such hard work. One way around this is to dig a few holes each season, gradually converting a field over several years.
- **Requires enough organic fertilizer** The technique needs enough farmyard manure and other organic matter to make compost. That is difficult in some areas if it is too dry for a lot of vegetation to grow, or if manure is not available.

Spread of the nine-seeded hole technique

Nearly 1500 farmers in Embu District, and many others in 11 other districts in the area served by CCSMKE, have now adopted the nine-seeded hole method. Where did it come from, and how did it spread?

In Runyenje's Division the technology was first practised by Mr Kagereki, a farmer in Ugweri village. He started by digging holes, putting farmyard manure and nitrogen and phosphate fertilizer in them, and sowing 12 seeds per hole. CCSMKE had already trained him in livestock management, and during a follow-up visit to check his livestock, the extension workers also saw his fields. He showed them his cropping technology, and they thought it was an excellent idea. But Mr Kagereki was putting too many seeds in a hole that was too small.

CCSMKE included the technique in a training seminar on agricultural practices for the first time in 1993. About 20 people participated in that course. One participant, a woman farmer, adopted the method. CCSMKE extension staff later visited her to follow up. Impressed by her success other farmers wanted to know more about the method. Neighbours came by, saw what she did and asked her about the technique. Within a year, 10 other farmers had taken it up.

CCSMKE tested variations of the idea on its own demonstration farm, and found that it was better to reduce the number of seeds to nine to avoid overcrowding the plants. The tests also showed it was not necessary to use expensive fertilizer: well-decomposed compost was better than a combination of manure and fertilizer.

Farmers are also modifying the method. For example, some plant five seeds in each hole rather than nine, or employ the technique to plant banana, papaya and mango trees.

Since the nine-seeded hole method had proved successful, CCSMKE has included it in seminars at its Macumo extension station which take place every three months. It also teaches it during field days. It is not only people who have attended training who employ it. Their neighbours and friends also frequently try it out on part of their land.

CCSMKE's development programme

Crop yields are low in Runyenje's Division because of low soil fertility and unreliable rainfall. Farmers cannot afford expensive artificial fertilizers, and they often sell their manure to nearby farmers who grow coffee and tea. They do not realize how valuable it is for their own land.

Encouraged by extension programmes in the past, many grow just one crop – maize – leaving them with a boring, unhealthy diet. They feed the maize stalks to their animals or burn them in the field. They control weeds with a hoe or a machete. A few farmers pile weeds, stones and stalks in lines in their fields to clear land for growing crops.

Runyenge's Division is semi-arid; severe droughts have occurred four times in the last 20 years: in 1984, 1998, 2000 and 2005. It was during the first of these that the people of Eastern Province sought relief food from CCSMKE. The organization responded by distributing food for free, but realized that this was not enough. It conducted surveys of the area and discussed problems and potential solutions with the farmers. It then started a "Food Increase Programme" to fight malnutrition and food insecurity. It focused on the most-affected groups: children under five, pregnant mothers and elderly people.

The extension services in the area – government and church – were clearly not adequate since there was only one extension officer in each of the eleven divisions. CCSMKE hired additional staff and began to establish extension stations to serve the four dioceses of Kirnyaga, Embu, Mbeere and Meru in the region. CCSMKE now has seven such stations. They enable CCSMKE to bring services closer to the community and serve farmers more easily.

The Food Increase Programme has evolved gradually over the last 20 years. It started with training programmes on livestock production, crop production, soil and water conservation, crop storage, safe use of pesticides, group formation and leadership, and so on. It has since added programme areas on health, water management for livestock and domestic use, gender issues, lobbying and advocacy, disaster management, and HIV/AIDS.

Mobilizing communities

CCSMKE's Food Increase Programme uses a participatory approach when working with communities. It first contacts the local leaders, church leaders and people in the area who already work with CCSMKE. These arrange a series of meetings to plan how CCSMKE can best help the community. CCSMKE uses participatory rural appraisal exercises during these meetings to help the local people identify problems and potential solutions.

The people typically name a whole range of problems: low food production, poor roads, lack of health facilities, lack of clean drinking water, lack of marketing, and so on. The appraisal exercises help them choose the highest priority problems to solve. They also think of solutions, and come up with a "community action plan". This plan is the basis for the CCSMKE's involvement in the community. It outlines the needs of the community, its goals, the actions required, who is responsible for what, a timeframe, and the budget needed.

Interest groups

As part of the participatory appraisal, the local people form "interest groups" to work on particular aspects of the plan. People join groups on a voluntary basis: examples include groups on crop growing, food preservation, livestock, water, marketing, health, HIV/AIDS, social development and the environment. Most groups have both men and women, but

some have women, men or young people only. Lydia is a member of the agricultural interest group in Ena village. CCSMKE supports the groups on the long run by providing training whenever a need is felt.

People have to contribute a small amount of money when they join a group. The group may decide to levy a regular membership fee, for example, every fortnight or month. The group can use this money to register with the government, open a bank account, and pay for the costs of its activities. The fees also show that the members are committed to the goals of the group. CCSMKE does not provide any funds, except capacitating them through training.

CCSMKE also welcomes groups that already exist. For example, many women already belong to social groups that manage savings or contribute to the cost of members' medical expenses.

The groups may work in many different ways. Some agree to help each other do heavy work such as building soil conservation structures or digging nine-seeded holes on each member's farm in turn. Others manage a joint project (such as a tree nursery or a plot of cropland) and share the proceeds among the group members. Another approach is to operate a merry-go-round savings scheme so each member in turn gets a large enough amount of money to invest in livestock or goods to trade. Other groups pool seed of different crop varieties, or bulk grain and mill it into flour to sell.

CCSMKE provides training for each group on its own topics of interest. The training may include one-day courses in the village, 3–5 day residential courses at the extension station, and educational tours to successful farmers in other areas. CCSMKE also arranges field days and demonstrations at the extension stations or on the farmers' own fields.

In agriculture the organization not only teaches the nine-seeded hole technology. Double digging, the preparation of liquid manure, post-harvest measures, pest and disease control, and agroforestry are all part of the curriculum.

The trainers may be CCSMKE staff, outsiders such as government officials or staff of NGOs or seed companies. The group members themselves may act as trainers: CCSMKE encourages them to show what they have achieved and to share their knowledge with others.

These activities are open to everyone in the community, not just group members. For example, CCSMKE works closely with schools, churches and the local administrations. Contacts with schools are established in various ways. Sometimes CCSMKE is approached by teachers who are engaged in environmental issues or by school heads. In other cases CCSMKE staff themselves offer training in the school's gardens. For educational tours and for residential trainings at the CCSMKE extension station, the organization charges a small amount to attend; other activities are free.

The chair of each group in the village is a member of an umbrella committee that coordinates activities of the groups and mobilizes members for village-wide activities such as building a drinking water supply, constructing a school building, or repairing the road. The village administration works closely with the groups, the umbrella committee and CCSMKE.

As each group becomes better organized and more skilled, it no longer needs close support from CCSMKE. It is able to manage its own affairs. That leaves CCSMKE free to focus on serving newer groups. It typically takes three years for a group to "graduate" in this way.

CCSMKE is currently working with 12 groups in Embu District. Dozens of older groups in the district have already graduated. CCSMKE also works with many other in ten other districts in the Mt Kenya East region.

Effects of the CCSMKE programme

The CCSMKE programme has had major impacts on the lives of people in the area. Many farmers now practise soil and water conservation on the fields, they grow a greater variety of crops, and they have more to eat and a more varied diet. The increased availability of forage has enabled farmers to expand milk production, and some farmers are able to sell milk to the dairy in Runyenje's town. CCSMKE's mobile health clinics have noted a decline in the numbers of malnourished children below the age of 5.

Fewer men are forced to migrate in search of work because they can feed their families and earn a living off their own farms. Today, both men and women use the nine-seeded hole method.

Some of the farmers who cooperate with CCSMKE sell fresh fruit or dry it for sale in the local market. They also dry and sell vegetables such as cowpeas, amaranth, pumpkins, and sweet potato tubers and leaves. Most of these farmers are organized in producers' and marketing groups.

One of these groups asked CCSMKE for assistance in processing surplus mangoes, sweet bananas and vegetables. In cooperation with government staff from the Ministry of Agriculture, the CCSMKE arranged a course on drying and marketing fruits and vegetables. As a result, one group of about 50 women collected enough money to buy three solar dryers. Seven groups in Embu District have bought similar equipment and use it to dry their produce.

The groups have helped cement relationships within the community. Group members are more ready to help each other, share information, and step in to resolve family disputes. Women are the leaders of many groups, and two of the four office holders in each group (chair, vice-chair, treasurer, secretary) are typically women.

Lessons

Build on local knowledge Farmers have a rich store of information and knowledge. Development organizations should recognize and build on this knowledge, and adapt it (or encourage local people to adapt it) where appropriate. The nine-seeded hole technique, for example, is an adaptation of a local farmer's innovation, and was refined by CCSMKE.

Farmers are the best extension workers They have a wealth of experience and other farmers know and trust them. CCSMKE has capitalized on this by providing them with training on farming techniques and on training methods. These farmers are now a source of information and ideas for their own communities.

Maintain good relations with other organizations Much of CCSMKE's success has been because it is able to draw on the skills, resources and goodwill of other organizations. For example, CCSMKE collaborates with other NGOs, the government and faith-based organizations in training, village planning, district-level coordination and so on.

Farmers want to see results Small-scale farmers cannot bear a large amount of risk. They want to see that something works before they are prepared to adopt it. CCSMKE arranges demonstrations and field days to show them new techniques, and encourages them to try them out on a small scale before adopting them on a larger scale.

Take advantage of unused resources Before, farmers could not sell their mangoes because prices during the peak harvest time were so low. By introducing driers, CCSMKE has enabled them to make and store a semi-processed product for sale at a later date when prices are higher.

Scaling up strategy

CCSMKE has scaled up its activities in various ways.

- It opened additional extension centres and hired extension personnel in order to fill a need: a gap in the official extension services. It has six professional staff and two support staff in Embu district, and a total of 132 staff in the whole region.
- It has adapted its approach from the original programme focusing on food production to an integrated approach covering health, education and various other aspects of development. That is because CCSMKE, as the development arm of the Anglican Church, felt that a more holistic approach was necessary not only to fight poverty in Mt Kenya East Region but also to respect the whole human being.
- CCSMKE collaborates with other NGOs, faith-based organizations and the government.
- It has sought funding from other sources to support its work. CCSMKE receives funding from several donors (Brot für die Welt, Tear Fund, Evangelischer Entwicklungsdienst, and the government of Kenya). This enables it to expand its work to new regions and to new subject areas.
- CCSMKE has mobilized parish priests from different Christian denominations to mobilize the community to identify their goals, develop action plans and form interest groups.
- CCSMKE works with schools to teach sustainable agriculture practices to children, and through them, to educate their parents. Pupils in agricultural clubs meet once a week in the school garden and receive training on environmental conservation, setting up tree nurseries, and the nine-seeded hole technique. They also learn cooking and home economics. The children run demonstrations of farming practices on the school farms, and are proud to show off their achievements during parents' days. Many families decide to adopt techniques which the children bring home from school.

More information: contact CCSMKE, ccsmke@yahoo.com

The work of Christian Community Services of Mount Kenya East is supported by Bread for the World.

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From agroforestry to improved livelihoods in Chebarus village

Christian Community Services, Diocese of Eldoret, Kenya



JULIUS SAWE IS THE proud owner of a tree nursery in Chebarus, a village in Kiplombe Location of Uasin-Gishu District, in Kenya's Rift Valley Province. The young man and his wife collect seeds of trees and plant them in polybags filled with humus and compost. They water the seedlings, keep the nursery free of weeds, use organic methods to control pests and diseases, and prepare the seedlings for transplanting.

They sell 10,000 seedlings a year. At KSh 5 each, that brings in KSh 50,000 (€576) – a tidy profit.

The couple started the nursery in 1998 when Julius realized that there was a strong demand for tree seedlings in the area. Their nursery provides a vital service in Chebarus: many farmers practise agroforestry in the village.

It has not always been like this. Eight years ago, the land in Chebarus was bare. The soil was eroded and heavily degraded. In the 1970s, most farmers in the area cleared their land of bushes and trees so they could plant more crops. They planted maize because they could sell it best. The soils were good then, and production was high. But after years of planting only maize, productivity became lower and lower. Farmers used a lot of fertilizer and pesticides, and the number of micro-organisms in the soil fell, degrading the soil. The lack of vegetation on the soil surface exposed it to wind and water erosion, and allowed water to run off rather than seeping into the ground. The farmers needed more and more fertilizer, pushing up their production costs further.

Impoverished soils, declining yields: the farmers of Chebarus were getting poorer and poorer each year. Many could no longer meet their basic needs. That was why Julius, unlike his brothers and sisters, was not able to finish school. He was forced to work as a casual labourer on other people's farms.

CCS's intervention

Christian Community Services (CCS) is the development unit of the Anglican Church of Kenya's Dioceses of Eldoret and Kitale. Through Anglican priests, chiefs and other local leaders, it invites local people to approach the CCS–Eldoret office for development assistance. Many communities express interest; CCS–Eldoret chooses those where it sees the biggest need. Chebarus was among the villages selected for assistance in 1998.

CCS–Eldoret staff carried out a participatory appraisal in the village to identify problems and opportunities. Many farmers complained about their farms' low productivity and their

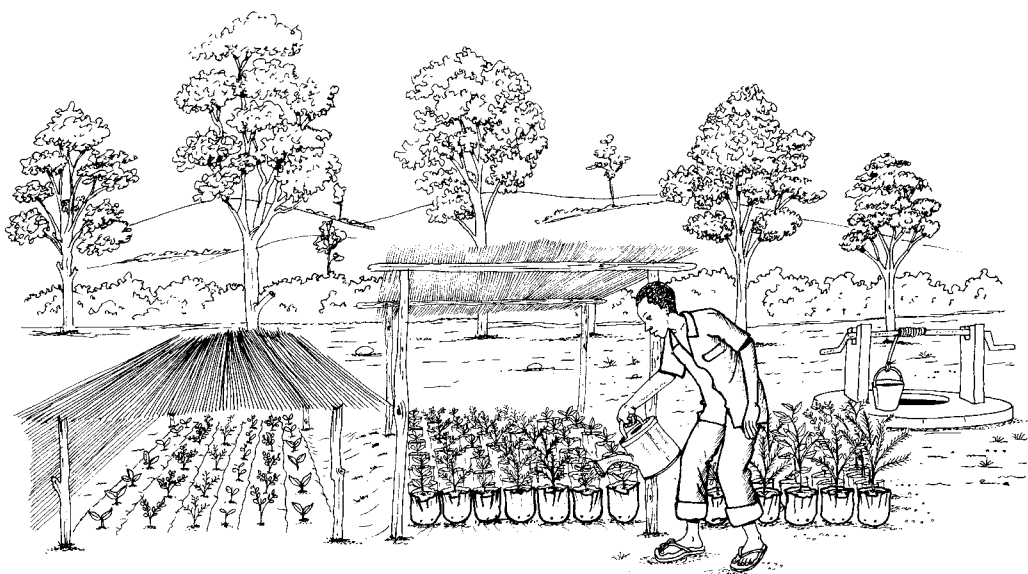


Figure 3 *Tree nurseries need constant care and a reliable supply of water close by*

falling yields. Through the appraisal exercises, they identified the degraded soil as the core of their problems. They said that maize monoculture and the clearing of bushes and trees were the cause of this degradation, and saw agroforestry as a potential solution.

When Julius realized that many farmers were interested in agroforestry, he saw a business opportunity. He and four other young village men asked CCS–Eldoret to train them how to establish a nursery. Each of the five started a nursery, most on their fathers' farms. In his first year Julius' enterprise generated KSh 50,000 – enabling him to buy his own 2-acre (0.8 ha) farm, where he now lives with his wife and two children.

Julius' group has since grown to 25 members. It is formally registered with the government, and has provided seedlings to 80 farmers, as well as to schools and churches.

The trees have totally changed the appearance of the villagers' homesteads. The soil fertility has risen: composting, crop rotation, mulching with leaves and twigs from the trees, terracing, ripping and creating ridges all help boost the soil's fertility and protect it from erosion. The trees provide foliage to use as green manure and as livestock feed; the animals produce manure which goes back onto the soil. The trees act as windbreaks, reduce runoff, and improve the soil structure, so increasing the soil's ability to hold water. These practices encourage micro-organisms and so improve the nutrient content of the soil, and at the same time create a better microclimate.

The farmers have diversified their crops, reducing their reliance on monocropped maize. They now grow indigenous vegetables again, harvesting a crop every three months.

The farmers say their yields have increased substantially. For example, their maize yields have risen from 10 sacks (1 sack = 90 kg) per acre to 25 sacks per acre (from 2.2 to 5.6 t/ha). The water level in shallow wells has risen, and farmers have enough fuelwood for their own use and to sell. The farmers have also been able to improve their livestock production and beekeeping. Food security has improved, and people's diets are more varied and healthier.

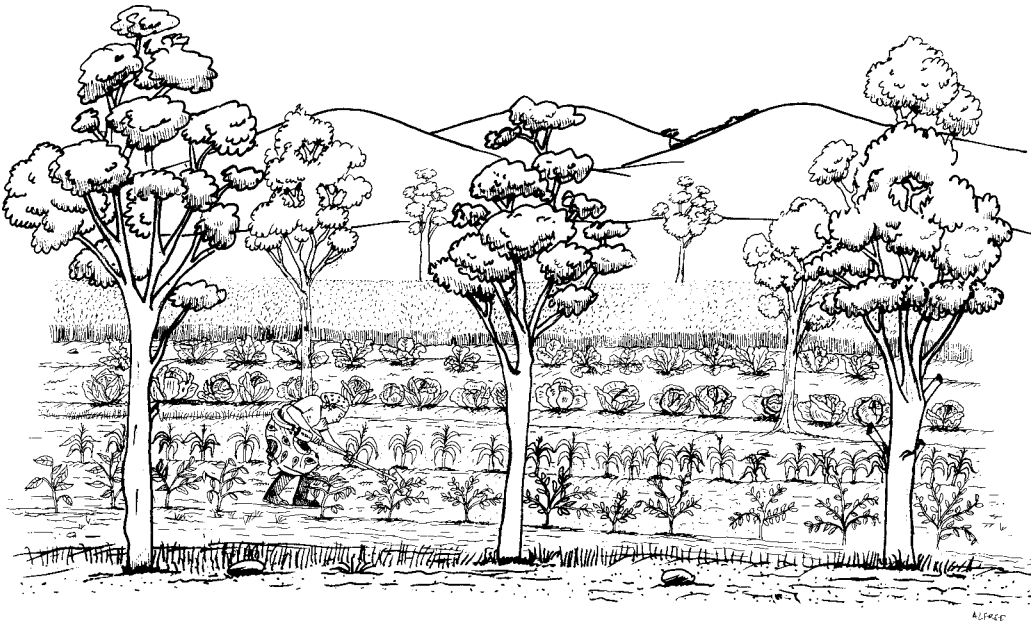


Figure 4 The trees have led to a marked change in the villagers' farms

Agroforestry has also had a positive effect on women's participation in development activities. They are now involved in making decisions in their households and in the village as a whole. Women have taken up leadership positions and responsibilities in the community. For example, they now participate in farm planning and budgeting; they access credit and manage the money, and run businesses such as shops. These changes have come about as men and women realized the importance of participation through CCS–Eldoret's training and awareness building activities. During the resource analysis in particular, the villagers learned that biggest benefits come if everyone is involved.

Agroforestry

Agroforestry has the potential to increase farm productivity, profitability and diversity. It produces a range of products: food, fuelwood, building materials, medicine and fodder.

Properly conceived and practised, agroforestry can contribute to the sustained productivity of the natural resource base by enhancing soil fertility, controlling erosion, enhancing the microclimate of cropping and grazing lands, and generally improving the environment.

Not every tree species can be used in agroforestry. They must have certain characteristics: they should grow fast in poor soils, fix nitrogen, or have rich foliage to increase the soil fertility. They should be suitable for pruning (to make harvesting possible and to reduce shading) and should not compete with other crops for nutrients. They should provide a yield of fruits, timber, seed, fodder, herbal products or materials useful to control pests. Some trees can also help with disease and pest management in crops, for example by repelling or attracting insects, or hosting predators that prey on pests (Box 5).

Box 5 Uses of common agroforestry trees

	Nitrogen- fixing	Fuel- wood	Fodder	Timber	Pest manage- ment	Seed
Calliandra	✓	✓	✓			
Casuarina	✓	✓		✓		
Grevillea	✓	✓	✓	✓		
Sesbania	✓	✓	✓		✓	✓

Another desirable characteristic is a tree's contribution to water conservation. Some trees are particularly good at reducing runoff, increasing the amount of water that seeps into the soil, and reducing evaporation by shading and cooling the soil.

The first step to introduce agroforestry on a farm is to establish trees. Some trees can be sown directly from seed; others can be propagated by use of cuttings; still others have to be raised in nurseries. To raise seedlings in a nursery, the seeds must first be collected and stored. Some types of seed should be treated with ash (which acts as a pesticide); some must have their skin cracked, or they must be put briefly into boiling water to break their dormancy.

The seeds are then planted in polybags filled with a mixture of compost and topsoil. The young seedlings must be kept under shade and watered regularly, then "hardened off" by exposing them to sunlight and reducing their water ration before they are transplanted. Of course, the nursery must be kept free of weeds and pests. All this means that managing a nursery requires a fair amount of skill and attention.

Before the seedlings can be transplanted, it is necessary to dig planting holes. The seedlings are planted in the holes in a mixture of soil and manure.

The trees can be planted in different places: intercropped, planted around field boundaries, or as a woodlot. The farmer must look after the trees to make sure they flourish: management practices include weeding, watering in the dry season, pruning, and harvesting.

Limitations of agroforestry

Agroforestry is possible everywhere. But it does have some limitations.

- **Agroforestry takes work** Caring for a nursery and maintaining trees in the field increases the farmers' workload, so cuts the amount of time they have to earn money elsewhere. The benefits of agroforestry should outweigh this, but farmers may be put off by the extra work needed.
- **It is best if practised on a wide scale** The benefits of agroforestry, such as reduced soil erosion and improved soil fertility and microclimate, are limited if only a few, scattered farmers practise it. Ideally, many farmers should adopt it to see the full benefits.
- **Raising seedlings requires water** Without enough water, it is difficult to run a profitable nursery.

- **Benefits take time** Some fodder trees can be harvested after 3 months. But other trees need longer before they start to yield. The impacts on soil quality and water availability will increase slowly but gradually.

CCS–Eldoret organization

CCS–Eldoret serves nine administrative districts in the northern Rift Valley Province. It was established in 1984 under the then-Diocese of Eldoret. Today its services cover the two dioceses – Eldoret and Kitale. Its goal is to enable the community to discover and overcome challenges facing it, so improving their living standards. CCS–Eldoret serves people who cannot meet their basic needs and are willing to use the resources they have available to change their lives. It serves all communities in its region, including non-Anglicans.

CCS–Eldoret works with about 150 groups in the Eldoret region on a whole range of development activities, including integrated rural development, water and sanitation, marketing and family planning. The agroforestry project falls under the first two of these.

CCS–Eldoret believes that people have to develop themselves, rather than being developed. It uses participatory development approaches that are demand-driven and meet people's actual needs (see Box 6). It believes that self-reliance and independence from initial inputs fosters project sustainability. So training is the core of all CCS–Eldoret's projects and is, besides awareness building activities, all that the organization provides.

CCS–Eldoret channels its training through village-level organizations and community structures such as schools, churches and ceremonial gatherings. It promotes the idea of forming self-help groups, if these do not already exist. After each training activity, CCS–Eldoret carries out follow-up meetings in the communities to identify further training needs, document successes, and plan further activities such as workshops.

To be close to the communities it serves, CCS–Eldoret has decentralized its services to zonal centres, which are within easy reach of the farmers. Over the years it has created a strong network of government institutions, NGOs, private companies and community organizations. Ties to government institutions prove essential, for example to find trainers on agroforestry, and to get funds for more training (CCS–Eldoret itself has only a limited number of trainers). These ties are also helpful in obtaining information on and understanding new policies.

Links to other NGOs such as LVEMP and VI Agroforestry enables CCS–Eldoret to provide training on nurseries. Together with its partners, CCS–Eldoret is involved in lobbying and advocacy campaigns at all levels. CCS–Eldoret lobbies in communities through meetings and awareness campaigns. At the policy level, it writes policy briefs and urges influential church leaders or church members who sit in parliament to present its issues.

CCS's contacts with private companies help link farmers with markets. Because the farmers are a part of the network, they do not need CCS's help to continue once the links have been formed.

Box 6 The change from PRA to PLA

CCS–Eldoret realized some gaps existed in the participatory rural appraisal (PRA) methodology it was using. PRA aims to empower people to do their own development. But CCS–Eldoret found that some PRA exercises raised expectations among local people that the organization could not meet. For example, one PRA exercise asks villagers to list whatever they feel to be a problem, and then to list the resources at hand to solve these problems. People identify problems like the lack of hospitals, electricity or roads, which cannot be solved using the limited resources available. So they come to expect CCS or other organizations to solve their problems for them.

The Participatory Learning and Action (PLA) approach was developed as a reaction to this difficulty. In this approach people analyse and understand their situation. They ask themselves why the situation is like this. They then have to identify opportunities that are **within their reach** by asking themselves what **they** can do about it. They then draw up their own action plan based on their own resources. For example, if an outside organization's funds are identified as possible resources, the local people would have to know how to mobilize these funds themselves. The community draws up its own programme. CCS then carries out training as part of this programme. CCS does not take any files to the field, and more importantly, takes no papers from the village back to the office. That means the local people do not think their problems will be solved for them, and they will not rely on CCS to find the funds to do so.

Policy and agroforestry

Various government policies affect agroforestry in a negative or positive way. The Forestry Act of 2005, for example, encourages farmers to have 10% of their farmland planted with trees. However, there are no incentives to farmers to do so, and no penalties for not planting this amount of trees. Concerning the cutting of trees, one law states that a permit is needed to cut a tree, and if someone cuts tree, he or she has to plant two new ones. There is a penalty for breaking this law, but it is hardly enforced, and obtaining the permits is difficult and expensive. CCS–Eldoret believes that there is need to educate farmers about the purpose and benefits of planting trees. Only this will change farmers' view towards this law and resource conservation. In addition, the government should not use a top-down approach when formulating such policies, i.e., not involving the people.

The department of agriculture has a unit to support agroforestry and other conservation practices. It provides training and holds free exhibitions so farmers can learn about these ideas. It also funds field days where farmers can show off their successes and train other farmers. The government should further expand such activities to reach more people.

Compared to other industries, farmers face high taxes for inputs and farm implements, and are taxed on their sales. The government sets aside a large part of its budget to promote industries other than farming. This puts a lot of hardship on small-scale farmers.

CCS–Eldoret would like to see the government promote agroforestry more. The government could enhance extension services such as training. It could also extend its awareness campaigns so that more farmers realize the benefits of agroforestry and implement it willingly rather than being forced to do so by law. The government could encourage the marketing of non-timber forest products such as honey. Farmers now find it easier to sell timber – which encourages deforestation.

Scaling up

As the benefits of agroforestry became visible, other farmers in Chebarus became interested and approached Julius' group, first to buy seed, and then to get training on nurseries and agroforestry. Julius' group has so far trained 11 other groups and many individual farmers on these practices. In a snowball effect, some of these 11 groups have in turn trained other groups. That means that agroforestry is now spreading without any outside intervention.

CCS–Eldoret got into contact with teachers who were interested in including agroforestry in their school activities. First though, the district education officers had to give permission for the teachers to participate in CCS–Eldoret's training. That meant that CCS–Eldoret had to introduce the education officers to agroforestry practices. It invited them to participate in a training themselves. That convinced them to include environmental issues in the curriculum. CCS–Eldoret then started to train teachers about soil conservation, tree nurseries, tree planting and environmental sanitation. Since then, two schools in the project area have regularly taught these issues to their pupils. They also organize field days to create awareness about the practice among teachers, parents and pupils of other nearby schools. The two host-schools and CCS–Eldoret buy seedlings for planting on these field days.

CCS–Eldoret helps arrange exchanges where groups of farmers visit other farmers who have successfully started using agroforestry. Hundreds have taken part, interacted and learned from each other. These visits are organized so that each group has the opportunity to send at least some of its members on a visit once or twice a year. The days are organized by the farmers themselves; CCS–Eldoret helps with arrangements but does not get involved in the content. Some time later, CCS–Eldoret follows up on the farmers' activities. Most of the time, it finds that the farmers have started replicating what they have learned. This has proven to be a cheap, efficient way of scaling up.

CCS–Eldoret also uses the media to promote agroforestry. It invites journalists from newspapers, TV and radio to visit the organization and talk to staff. The media also sometimes cover field days and campaigns. As a result, the number of farmers and other organizations who have approached CCS–Eldoret has risen notably. Typically, if training courses are announced on the radio, the number of participants doubles.

More information: contact CCS–Eldoret, elreco@africaonline.co.ke

The work of Christian Community Services, Diocese of Eldoret, is supported in part by Bread for the World.

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Dairy goats: Hope for farmers in Embu and Mbeere districts

Diocese of Embu, Kenya



HOSEA NJERU WATCHES PROUDLY as his goats eat the fodder he has put into their feeding trough. There are 18 of them: good, healthy, strong goats. He will keep the female kids, and sell the young males: they will fetch a good price in the market. His wife comes to milk the females. The goats are producing a lot of milk at the moment: enough for Hosea's family, and some extra to sell.

The goat shed is made of wood, and has a thatched roof. The floor is made of wooden slats, so the droppings fall through to the ground beneath. Every few weeks, Hosea can raise the floor and scrape out the dung to use as fertilizer on his farm.

Next to the shed with the does and kids is a separate stall for a buck. Hosea keeps the male goat that belongs to the Gitare Integrated Self Help Group, the group of dairy goat farmers he belongs to. Every few days, one of the other group members brings round a female goat, and takes it to the buck for mating. The male is a Kenya Alpine, an improved breed, so the offspring grow quickly and can be sold after nine months.

Hosea started with just one goat in 2000. He got it from the Integrated Rural Development Programme of the Diocese of Embu, the local branch of the Catholic Church in Kenya. Hosea mated this female with a buck that the Diocese also provided, and after five months it gave birth to a fine female kid. Hosea loved this animal. But he had signed a contract – so when it was six months old, he gave it back to the Diocese's Integrated Rural Development Programme, which passed it on to another farmer to start a new herd.

Seven months later, Hosea's female gave birth to another kid. He hasn't looked back. By 2004, there were 18 in his herd, all descended from the first female. "My goats have a history of kidding twins and sometimes triplets", he says. He is sure this is because of the good feed and care he gives them.

Hosea has been able to earn enough from selling animals and their milk that he has been able to afford to spend KSh 18,000 (€207) on a machine to chop fodder. He has bought another quarter of an acre (0.1 ha) so he can plant fodder – doubling the size of his farm. He and his wife have saved up enough to send their daughter to a private primary school, costing more than KSh18,000 (€207) a year. He no longer has to look for work on building sites; instead, he sells his goats to people who come from all over Kenya.

The Gitare Integrated Self Help Group has 16 members: seven men and nine women. Ten of the members have dairy goats, while 6 keep dairy cattle, but are considering adding goats after realizing the benefits they bring.

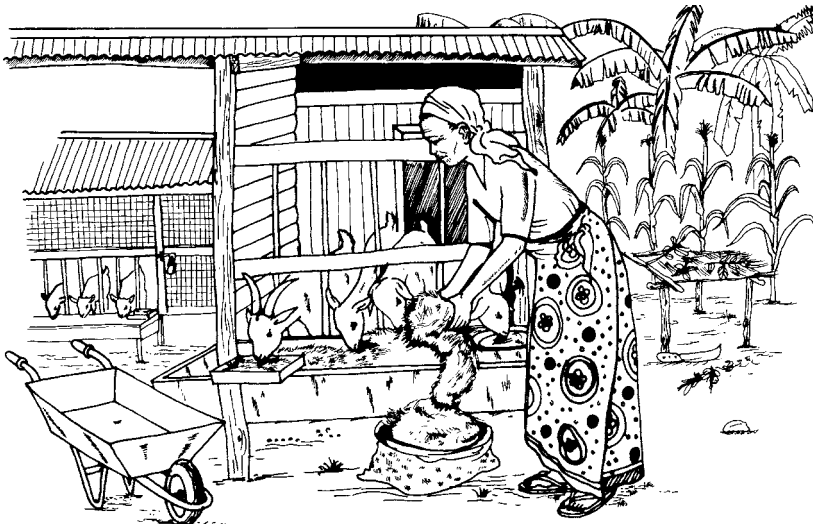


Figure 5 *The goats are kept in sheds and fed with crop residues, household waste and foliage*

DOE's community development approach

The Diocese of Embu covers the two districts of Mbeere and Embu. Mbeere is drier, but Embu has good rainfall: around 1200 mm a year in Hosea's village. But land ownership in Embu is fragmented: many plots are less than half an acre (0.2 ha), and many people do not have any land at all.

The Diocese believes that "self help is the best help". It currently coordinates well over 180 self-help groups, including the one in Gitare. Many farmers in Embu have one or two goats of a local breed. These animals are disease-resistant and can survive under difficult conditions with little fodder and water, but they take a long time to mature and produce little milk – barely enough to feed the goat kids.

As part of its Integrated Rural Development Programme, the Diocese implements a dairy goat upgrading project to fight food insecurity and poverty. The project promotes cross-breeding of the local goats with improved dairy bucks. To qualify for this type of assistance, farmers must meet certain basic criteria. They must belong to a self-help group of at least 15 members. They must have access to some land for housing and to produce fodder. They must contribute both in cash and in kind towards the cost of the project. The Diocese gives such groups several female goats; the farmers who are chosen to take care of the first goats must mate them with an improved male, then pass on the first female kid to another farmer.

A programme history

The story of the Diocese's goat programme is long and has not always been easy. It has had its successes and failures, but over the time it has built on its successes and learned from its failures. It started in 1993 by assisting needy farmers who were earning less than a dollar a day. It gave out goats for free to these families. The farmers were only required to provide housing, feeding and veterinary care to the goats. The local Church committee acted as the guarantor and monitored progress. The participants did not have to be in a group, and they did not contribute any cash.

One of the first beneficiaries was a woman who was confined to a wheelchair. She was given a good dairy goat producing 2 litres of milk a day. She milked the goat for well over 4 years before finally selling it to a butcher. The goat kidded twice after being served by local unimproved bucks, but both kids died of pneumonia.

The programme also gave goats to two women's groups. The first group's buck died without fathering any kids: a lack of libido sometimes caused by poor management. The second group disintegrated after 2 years, and only one farmer actually achieved any tangible benefits.

An internal evaluation in 2001 showed that the programme suffered from three major flaws:

- The farmer participants did not feel they owned the project. They saw it as a diocesan activity – after all, they did not contribute any money towards the cost of the goat.
- Because the project was dealing with individual farmers, implementation and monitoring were complicated and expensive.
- The diocese did not have a sustainable system of goat breeding, so most of the farmers ended up in-breeding with the same male all the time, or using local males. Both of these defeated the project's purpose.

As a result, the programme made some important changes:

- It now requires the farmers to attend community meetings and participatory appraisals so that they can understand the diocese's policies. The community members discuss the various options and activities (including goat breeding), chooses the ones they see as most important, and make a formal request to the programme for assistance.
- Those interested in goat breeding have to form a group and apply for registration with the Diocese's Integrated Rural Development Programme. If their application is approved, they must register their members and pay a fee of KSh 150 (€1.75) each. The group receives training on group leadership and management. This training enables them to determine their objectives and decide on by-laws. The programme staff helps them assess their needs, identify their problems, and draw up a group action plan.
- The group then requests training about dairy goat rearing. This training normally lasts 3 days and is given by staff from the Diocese programme or from the relevant government ministry. It covers dairy goat management and production, including feeding, housing, breeding, disease and pest control. It also stipulates the key activities, roles and responsibilities of each stakeholder. The group must register with the Dairy Goat Association of Kenya, help choose a buck and contribute towards its purchase cost. Five members who meet specified criteria receive one female goat each for demonstration purposes. The group signs a contract with the Diocese of Embu, stipulating that each member must return the first female kid to the programme so it can be given to someone in a new group.

The Diocese of Embu's dairy goats programme draws heavily on groundwork laid by an earlier, GTZ-sponsored project in the Ministry of Agriculture and Rural Development to promote the dairy goat industry in Kenya. From 1994 to 2000, the Integrated Small Livestock Project helped develop an improved dairy goat breed by crossing local stock with imported German Alpine animals. It also helped the ministry create a strategy for promoting dairy goats, established the Dairy Goat Association of Kenya, and trained extension staff.

Stakeholder roles

Individual participants must be registered members of the group. They must either have their own local goats or have received a female goat from the diocesan goat project which they mate with the group's buck. The group members pay KSh 2,600 (€30) for the project goat and return the first female kid to the project for onward lending. They must provide appropriate housing (costing about KSh 5,000, or €58), feed the goat, manage breeding, and take care of veterinary services (which costs an average of KSh 30, or €0.35, per month). They sign a contract with the group promising they will look after the goat properly, and register with the Dairy Goat Association of Kenya (a fee of KSh 300, or €3.50).

The group must be registered with the diocese to qualify and participate in the upgrading project. It must raise KSh 3,000 (€35) towards a 3-day onsite group training on dairy goat management and marketing, as well as KSh 5,000 (€58) towards buying an improved buck. It applies on behalf of its members to the Diocese to join the dairy goat project and then monitors its implementation and management. It facilitates the return of the first female kid. It also networks with other stakeholders such as the Dairy Goat Association of Kenya (for breeding) and relevant government ministries (for technical support).

The programme development committee comprises representatives from all the groups registered with the programme in a particular area. It screens groups that want to join the programme and recommends them for approval or rejection, then forwards their applications to the programme management team for technical appraisal and approval. It facilitates collaboration and networking among the groups, and is responsible for programme planning, implementation, monitoring and evaluation.

The programme management team is composed of programme staff. It provides technical inputs and advice to the project development committee and the groups, and facilitates training of the group members. It monitors the project implementation and links the groups with the Dairy Goat Association of Kenya. It facilitates the choice and purchase of the buck from recognized goat breeders, and places the nannies and bucks with the groups.

Box 7 More milk from upgraded goats

Upgrading local goats by crossing them with purebred dairy bucks improves the milk production of the offspring. Each new generation of crosses produces more milk.

Breed/crosses	Daily milk production
Local goat	0.5–1 glass (250ml)
1st generation	4 glasses (1 litre)
2nd generation	8 glasses (2 litres)
3rd generation	12 glasses (3 litres)
4th generation	20 glasses (5 litres)

At each stage, the female must be bred with a different purebred male to avoid inbreeding.

Socio-economic impact

Fifteen groups composed of 127 farmers (66 men and 61 women) in Embu and Mbeere districts are now raising approximately 450 upgraded goats. Some have taken up goat breeding full-time.

Increased milk production Farmers used to keep goats mainly to slaughter on important occasions, and sometimes to sell. The dairy goats produce enough milk to sell at the attractive price of KSh 40–60 per litre. Local people know that drinking goat milk helps make children healthy, clever and grow fast, and that the milk is especially good for AIDS patients. Tea with milk is popular in the project area, and people say that adding a small amount of goat milk to the tea is enough because it has a lot of nutrients.

Improved crop yields Intensive goat rearing produces a lot of manure. The traditional practice of tethering the goats and allowing them to graze during the day meant that it was not possible to collect this manure. Keeping the goats in a shed all the time and feeding them with cut fodder produces more manure, and makes it easy to collect. Goat manure makes good fertilizer for kitchen gardens, maize, bananas, macadamias, Napier grass and coffee. Many farmers say they get good yields because they use manure on their crops.

Better use of waste Goats eat all kinds of crop residues, household waste and foliage from trees, turning them into valuable milk, meat and manure. Goats are ideal for the small plots of land in the wetter areas of Embu District, as well as the larger farms in the drier parts of Mbeere District.

Some goat keepers have virtually no land, so must collect fodder from roadsides or small plots. A cow eats as much fodder as eight goats. So goats are ideal for smallholders, and encourage environmental conservation through fodder grass and tree planting.

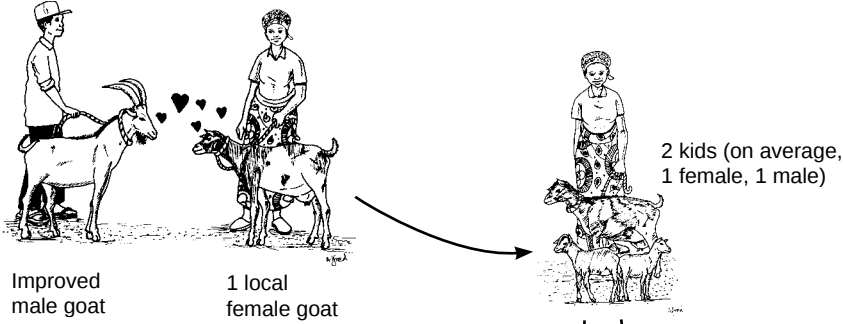
Increased value of the upgraded stock Although the local goats are small, they take a long time to reach maturity. They produce very little milk. They are the result of uncontrolled breeding. The dairy goat project introduces a high-quality Kenya Alpine buck to upgrade the local goats. The male offspring grow faster and mature earlier, so earn more income for the farmer. The female offspring produce more milk and earn more money as breeding stock. All goat products and by-products – live animals, meat, milk and manure – fetch prime prices.

Box 8 Value of 1-year-old animals

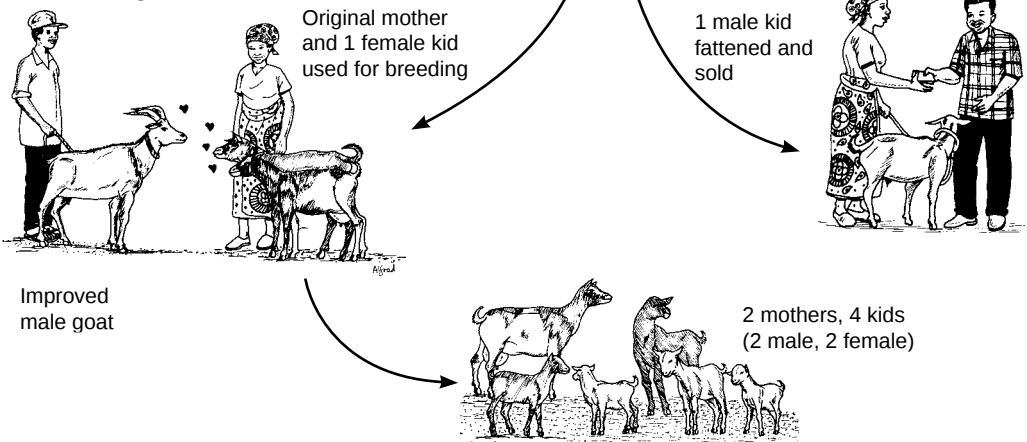
Crossing local females with improved females raises the value of the offspring. Figures are in Kenyan shillings (€1 = about KSh 87)

	Female	Male
Local goat	Less than 1,000	500
1st generation	4,000	1,000
2nd generation	6,000	1,500
3rd generation	8,000	8,000
4th generation	12,000	10,000

1st mating



2nd mating



3rd mating

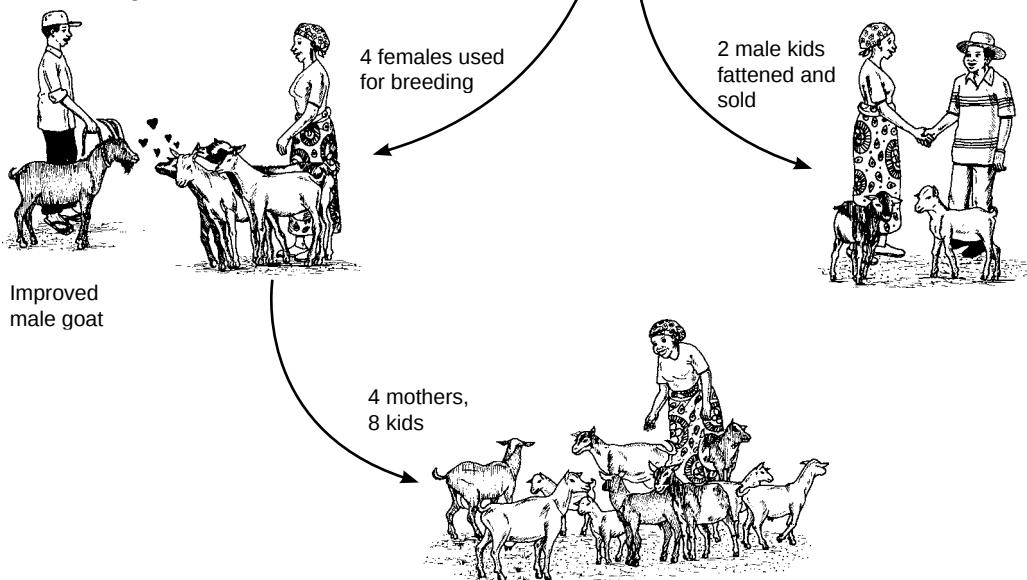


Figure 6 The goat breeding programme enables farmers to build up an improved herd rapidly, as well as providing milk and an income from selling animals

Improved socio-economic status and cohesion The project participants are members of groups where they share knowledge, resources, exchange visits and experiences. Even the poorest members can upgrade their animals. Each group keeps a buck and appoints one of the group members to keep it; the other members take their goats to the buck for breeding. The buck keeper maintains breeding records and provides a place where group members can be trained. The members meet regularly to plan, review their activities, and discuss problems. They also get additional training on group dynamics and leadership.

The female goats produce kids 5 months after breeding, so can be bred twice a year. They often bear twins or triplets. That means their owners can build up their stock quickly (Figure 6). From a single female, it is possible to produce two kids (on average, one male and one female) as a result of the first mating, four from the second mating, 8 from the third, and so on. If the females are mated with purebred bucks each time, they will produce progressively more milk, and the kids will be worth more because their genetic makeup is better. Within 4 years, a farmer should be able to build up a herd of (say) 31 animals, worth KSh 190,000. If the animals produce more female kids, the herd will be even larger. The females can be used for breeding, and the males sold for meat. Males of the third or fourth generation crosses can also be used for breeding.

Scaling up

The dairy goat project has scaled up its activities in various ways. These can be grouped into four categories: quantitative, organizational, functional and political (see also page 117).

Quantitative

Return of the first kid The programme started with a stock of 55 upgraded nannies in nine groups. Returning the first female kid to another farmer in the group enables other farmers to benefit and ensures continuity of the project. To date, 127 farmers in 15 groups have benefited from upgraded dairy goats, and they now own over 450 upgraded goats.

Local contribution The farmers make a contribution in cash: that ensures that they feel they own the project, and the money covers 30% of the project cost. The members are also expected to contribute labour and construction materials, which accounts for another 20%. The project budget contributes the remaining 50%. These local contributions enable the project to reach more people.

Organizational

Implementation structure The programme's policies were adjusted to improve implementation. It used to work with individuals or groups who were loosely affiliated to the programme. This limited the number of people it was possible to work with. As a result of an internal participatory evaluation, changes were made to this approach. Now, participants must be members of a group that is registered with the programme. The Diocese established a project development committee composed of elected representatives from all the registered groups in an area. This committee is responsible for problem identification, planning, implementation, monitoring and evaluation. This allows the programme to reach more people.

Capacity enhancement. The project development committee has been trained regularly on group organization and management so it can deal effectively with the individual groups' needs. It interacts with the group members and provides them with feedback. The capacity of the project staff has been enhanced through workshops, seminars, meetings, mentoring, exchange visits and on-the-job training. As a result, the staff can provide technical and administrative support to the committee and to the groups.

Functional

Breed improvement To increase their income, the farmers are advised to register their local goats with the Kenya Stud Book and breed them with the group buck. The Kenya Stud Book is responsible for registering and maintaining records of all breeding animals in the country. This adds value to the animals, so brings in more money

Upgrading local chickens Seven out of the 15 groups in the goat project have diversified into upgrading local chickens. They do this to bridge the gap before they can start making money from their goats. Starting with a local goat, it takes 21–24 months before they can earn money by selling the offspring, and 5 years to breed a pedigree goat (the highest class), which fetches KSh 12,000 at the age of 1 year. Chickens breed faster, so the farmers can use them to fill this gap. The local chickens are small and lay few eggs because they are inbred, so the programme advised the farmers to upgrade their local stock using a dual-purpose breed, called Kenbro. This gives up to 270 eggs a year, compared to 150 eggs from the local birds.

Biogas Farmers from one group have built biogas digesters to use the goat manure and save on wood fuel. They copied this idea from one of their neighbours. They used polythene tubes to make the digester and storage tank. Pipes carry gas to a burner in the farmer's kitchen. The group has so far constructed five biogas units, and plans to make units for all 23 members. Other groups are also interested in adopting this technology.

Savings and credit Participatory needs identification revealed the need for the goat keepers to save money and have access to credit. The groups ensure that their members save a small amount regularly with the Mbeere/Embu Savings and Credit Association, a diocesan rural savings programme. This enables them to pay for school fees, medicines and other needs. The savings protect the farmers from the temptation of selling their valuable goats for low prices in an emergency.

Political

Collaboration and networking The project recognizes the benefits generated through collaboration and networking with other industry stakeholders. It ensures that all the goat groups and partners are linked with the Dairy Goat Association of Kenya, which keeps breeding records, provides extension services, manages breeding bucks, facilitates registration of upgraded animals with the Kenya Stud Book, provides vaccines for contagious caprine pleuropneumonia (a serious disease in goats), and facilitates the marketing of dairy goats (for which it receives a commission of 10% of the sale price). The Ministry of Agriculture provides extension services and training, while the Kenya Stud Book is responsible for registration of animals. The project also links the farmers with other groups in the district and elsewhere so they can obtain breeding stock and avoid inbreeding.

Advocacy and lobbying The project works closely with government departments, has negotiated memoranda of understanding with key partners, and communicates through newsletters and field days. Project staff attend meetings of the district development committee, a forum for discussion on development activities within the district. Many groups not affiliated with the diocese have also adopted the upgrading of dairy goats spontaneously as a result of the Diocese of Embu's work. For example, Njaa Marufuku, a national government poverty eradication programme, supports dairy goat production through groups, using the Diocese's approach.

Challenges

The project has faced various challenges.

- **Environment** Poor rainfall reduces the amount of fodder available. The farmer groups are expected to plant suitable shrubs and trees as fodder for their animals and to protect the environment. However, frequent droughts devastate newly planted fodder trees and shrubs.
- **Diseases** Contagious caprine pleuropneumonia is endemic in the area and remains the greatest threat to the dairy goat upgrading project. The veterinary department provides vaccination services when there is an outbreak. The Dairy Goat Association of Kenya also provides vaccines to the veterinary department so they can vaccinate its members' animals. The project encourages routine vaccination every 6 months – even though this is expensive.
- **Parasites** Intestinal worms reduce the productivity of the stock. The farmers have to de-worm their animals regularly every 3 months.
- **Breeding** Problems include a failure to detect heat on time, miscarriages and the need to repeat mating if the female does not become pregnant. Project staff, Dairy Goat Association assistants and government extension officers provide training on skills such as heat detection and the control of reproductive diseases. If more males are born than females, farmers may become discouraged because they cannot increase their flock quickly. The project advises farmers to keep more than one goat to increase their chances of getting female kids.
- **Group cohesion** Groups are vital to managing an effective breeding system, but poor leadership means it is not always easy to keep the group together. The project ensures that the groups acquire the leadership, organizational and management skills they need.
- **Handouts culture** Some development organizations still provide free handouts to farmers, creating dependency and killing innovativeness and hard work. Farmers have come to expect such handouts. Overcoming this takes a lot of time and effort. The Diocese requires cash contributions from the beneficiaries of up to 50% for bucks and 30% for females, and KSh 3,000 for training. The farmers must also pass the first female kid back to the programme so it can be allocated to new group members, and requires them to surrender the breeding bucks to the Dairy Goat Association of Kenya, which rotates them to other groups, so avoiding inbreeding.
- **Dwindling donor support** Despite the successes, dwindling support from donors limits the programme's ability to scale up its work. The price of bucks and nannies is

beyond the reach of most potential beneficiaries. Support is still needed to continue the project.

- **Free-range grazing** The free-range grazing system is common in Mbeere. It is difficult to control breeding when goats are allowed to mix out in the field. The Diocese promotes zero grazing, where the buck is kept in a pen, and the females are brought in for breeding when they are on heat. This system is also suitable where farmers have only a little land and they cannot get enough fodder.
- **Castration** To prevent unwanted breeding, all crossbred males that are not suited for breeding should be castrated within the first 6 months. But people are reluctant to do this because they think it will stunt the animals' growth.
- **Consumer attitudes to goat milk** Many people say that goat milk smells and tastes strange. This is because the females are traditionally kept with uncastrated males, and the milk picks the males' characteristic odour. Separating the females from the breeding buck, and castrating unwanted males, solves this problem, but it is still necessary to convince customers that the milk is good.

Lessons

- Keeping goats produces many benefits for farmers: they can earn money by selling milk, meat and live animals; they produce milk for home consumption; and they can even make cheese to sell. The manure is valuable as fertilizer and can be used to make biogas, a new technology which is spreading quite quickly.
- Dairy goats are easy to manage, produce many kids and a lot of milk, and can be very profitable. Raising goats in confinement is environmentally friendly. It needs little heavy work, so can be done by women and men, young and old, and people who are suffering from HIV/AIDS.
- Local contributions towards the project enhance ownership and sustainability. Development projects should ensure that project participants contribute in cash, even only a small amount – to ensure their commitment to the project.
- Technical knowledge is a key to success. The project previously assumed that people knew how to keep goats. This led to disappointment. It is necessary to train them on both the technical aspects of goat keeping as well as the project's particular management procedures.
- Collaboration enhances success, especially where the partners' strengths complement each other. The farmer groups, Diocese staff, the Dairy Goat Association of Kenya, the ministry and various other partners work together to manage the programme and ensure success.

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The Diocese of Embu's Integrated Rural Development Programme is supported by Misereor
www.misereor.de

A tale of two villages: Integrated agriculture in Lare Division

Baraka Agricultural College, Kenya



It's 1998... The people who recently arrived in Lare Division, in Nakuru District, are desperate. There have been some terrible ethnic clashes – a fight over land – and many of the men were killed. The remaining people – 26 families – have had no choice but to leave. They have fled their homes, their farms, their cattle. There are only two able-bodied men, 22 women with their children, and a dozen young orphans, along with several elderly people. They have arrived in Lare Division with nothing. The local Catholic Church has tried to help them: it has given them food, blankets and clothes, treated the injured and sick, and given them tents to live in.

To help them get back on their feet, the Catholic Diocese has leased the people some land in Baraka village – 1.5 acres for each family. They have built houses of mud and corrugated sheeting provided by the Church. They have cleared the bush and trees and started farms. They have managed to grow some maize and beans, and a few vegetables, and they have bought a few chickens. But it's not enough: yields are poor, the children are malnourished, and their mothers have no money to buy food, let alone send them to school. Other people nearby view them with some hostility, and look down on them as “refugees”. In desperation, the women leave for days on end to seek work on farms over 40 km away – leaving the children without anyone to care for them.



Figure 7 1998: The people of Baraka were desperate

Fast-forward to 2006...

The people in Baraka village now have enough to eat. They grow enough to sell: maize, beans, sweet potatoes, cassava, bananas, and even vegetables. They have managed to extend their tiny houses, and the children now all go to school. They can afford to buy new clothes at Christmas. The women have started a savings group, and they want to build tanks to hold rainwater so they don't have to buy expensive water from outside. They welcome visitors with tea, and insist that their guests take some potatoes or maize home with them as a gift.

This is the same village – the same Baraka. The same people. But their lives have changed dramatically – for the better.

What happened?

Planning change

A training institute in Molo, some 70 km away, by coincidence shares the same name as the village. Staff from this institute, the Baraka Agricultural College, visited Baraka (the village) in 2000. The village is in the area served by an integrated rural development project that College's community development programme was just starting. The project management selected Baraka village as one of three in Lare Division to focus on.

Development workers from the College called the people of Baraka village together for a *baraza*, a community mobilization meeting. The College staff asked the villagers to divide into groups: men, women, and young people. They asked each group to identify the problems

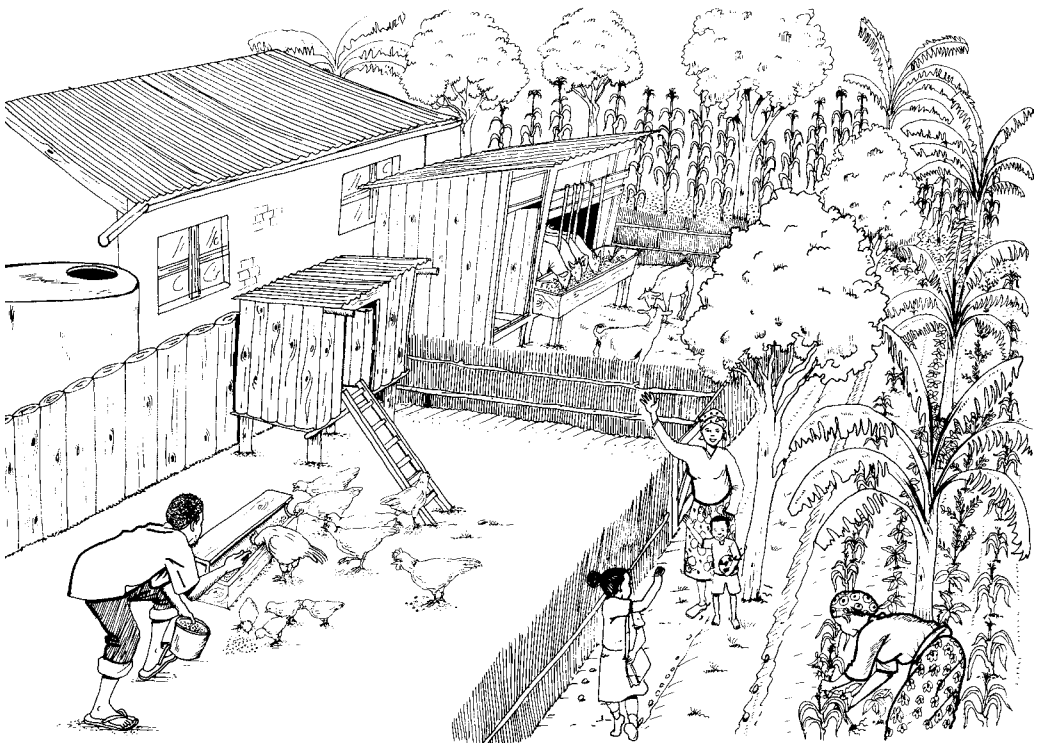


Figure 8 2006: The Baraka villagers are prospering, thanks to integrated farming

Box 9 Baraka village – The land and climate

Baraka village is in the lower highlands of Rift Valley Province in Kenya. The soils are not bad: they include well-drained loams with patches of black cotton soils in some areas. However, they are badly eroded because of deforestation and inappropriate cropping methods.

The rainfall averages 600–800 mm per year, but is erratic: some years have very little or no rain.

The area used to be grassland with scattered trees, but many of the trees have been cleared to make way for farming. That has made the rainfall erratic and temperatures higher, especially during the dry season. Wind and water erosion are a big problem, leading to infertile soils and polluting ponds and streams. Yields are generally poor – around 6–8 bags of maize an acre (1.3–1.8 t/ha), but with appropriate land management, it is possible to get good yields: 12–15 bags an acre (2.7–3.4 t/ha).

they faced, and to select the most important. The people all said that food security was the biggest problem. They suggested that the College help them organize to overcome it.

Each of the groups elected one person to represent them. These community representatives included one elder (a man), one woman, one man, and two teenagers – a boy and a girl. These representatives were to manage activities in their groups, report on their group's activities, and coordinate with the community worker and other College staff.

The development workers agreed to give the villagers two days of training on leadership skills, and on how to organize themselves, plan activities and keep records.

The development workers also discussed alternative farming techniques with the villagers: planting time, choice of crops in case of drought, tree planting, and the need to diversify crops to spread risk and maximize output. The villagers discussed the various possibilities and came up with an initial work plan.

The villagers registered as a group with the Ministry of Culture and Social Services. Registration is necessary for the group to access services such as savings and credit, and to ensure the stability needed to work together in the long run with partners such as the College.

Sources of inputs and expertise

The College contacted various sources of inputs and expertise. They asked the Ministry of Agriculture for assistance with soil conservation. Ministry staff came to do on-farm demonstrations of soil conservation techniques such as marking contours with a line level, constructing contour bunds and terraces, and planting grass strips.

The 26 villagers divided into two subgroups. Each subgroup decided to work on each member's farm in turn, to construct contour bunds and do other heavy work.

The College then asked the Kenya Agricultural Research Institute to advise on what varieties of cassava and sweet potato to plant, and how to grow them. The College bought certified planting materials from the Institute and gave them to the villagers.

The Forestry Department also came to the village to help identify what type of trees to plant for timber, fodder and fuelwood. The department supplied seedlings of each type and told

Box 10 “Life has never been the same”

“Life has never been the same again for me. I used to go for a week to look for casual labour in order to look after my family; now that I can grow produce on my farm and sell it. I don’t need to go away any more. My children can go to school and I can do it all even though my husband is dead.”

– Mama Wangari, Baraka resident

“We are able to go to school even though we don’t have parents. These people have been like our parents and have even helped us work in our farm.”

– Njeri, high school student and orphan from Baraka

the villagers how to plant and take care of them. The subgroups planted the seedlings on each of their members’ farms in turn.

This process took about a year and a half. The College’s development project paid for the costs of all these inputs: the villagers were unable to pay even a share. The villagers met regularly every Friday evening to review their progress, discuss problems, and plan what to do in the following week.

One College community development worker lived and worked in the village. This worker served other nearby villages as well: she served around 800 farmers in all. But because she lived in Baraka, she was able to interact closely with the local people. She attended some of the Friday meetings, but as the group became stronger, it was not necessary for her to be there every week.

The College also linked the farmers with various other service providers, such as a savings and credit agency and dairy goat breeders. The College established a development organization called Mtakatifu Clara Mwangaza in Lare (a larger village nearby). This organization provided various types of support: savings and credit, training, inputs such as polythene to line water pans, linkages with other service providers, and follow-up support.

Progress was slow at first. The farmers were sceptical; they were not used to growing crops like cassava. They planted a small plot first, watched how it grew, and then decided whether to expand the area they planted the next season. Sweet potatoes were more popular, and the villagers took to them very readily. They had fewer problems in accepting the trees, but some of the species were slow growing, so took time to establish. By the fourth year, success was clearly evident: the farmers had adopted many of the technologies they had learned, their incomes were rising, the group was strong and well-organized, and group members were even training people in neighbouring villages how to use the improved techniques and providing them with planting materials.

The College phased out of its direct involvement in Baraka in 2004. As a result of its 4 years’ work in the village, the villagers had improved their incomes and livelihoods to such an extent that they no longer needed the College’s help. The College was able to move to other villages in Nakuru and Baringo districts.

Box 11 A pathway out of poverty

How can small-scale farmers break the vicious cycle of soil erosion, low yields, hunger, poverty and misuse of resources?

Sustainable agriculture offers a pathway out of poverty for these families. By using appropriate farming techniques that conserve the soil and restore its fertility, they can raise their yields, and earn enough to break out of the cycle.

It is hard for them to do this by themselves. They lack the resources and information they need to adopt the improved techniques. Individual farmers do not have the wherewithal to act on their own.

Institutions such as Baraka College can bring together the resources needed, and organize the farmers into groups that can plan, then act on their plans.

The story of Baraka village shows how this can be done.

Savings and credit

As the villagers' production increased, they were able to sell their surplus produce in the market in Lare. They formed a merry-go-round savings club to act as a source of credit for the group members. Members undertook to put KSh 100 into a kitty every week. They divided the kitty into two: each week, half went to one of the families so they could buy a goat, some household utensils, or something else that the group as a whole agreed on. The other half of the kitty was used as group savings. They banked it with Mtakatifu Clara Mwangaza's savings scheme. This organization pays interests on deposits and provides credit to organized groups. Individual villagers could apply for a loan through their group to invest on their farm or to pay school fees. The group acted as guarantor for these loans.

Roles of stakeholders

The programme's success was a result of collaboration among various stakeholders, coordinated by the College's community development programme.

The villagers themselves decided what they wanted to do, then put it into practice. They did all the farm work and decided the types of external assistance they needed. This involved risks and innovativeness: they planted crops they were not familiar with, and started raising goats and chickens.

Representatives of the community coordinated the villagers, mobilized them to decide on what to do so they could feed themselves, and how to overcome their various other problems. As the group got stronger and better organized, the representatives mobilized the villagers to lobby the local government and other organizations for help.

Baraka College networked with donors on behalf of the community. The College identified the problem of food insecurity, helped the villagers think of potential solutions, and facilitated the provision of advice and inputs from various other sources. A College community development worker lived in the village, so was on hand to work with local people on a regular basis and deal with problems as they arose. Other College staff provided support, training, advice and coordination, arranged for inputs, and handled financial aspects of the project.

Resource institutions such as Mtakatifu Clara Mwangaza, the Ministry of Agriculture's soil and water conservation team, the Kenya Agriculture Research Institute and the Forestry Department provided advice and training on their areas of expertise, planting materials (cassava stakes, sweet potato vines, tree seedlings), improved livestock breeds (chickens and goats), credit facilities, and so on.

Integrated agriculture

The Baraka farmers had only a small amount of land, and they had little capital and few skills to begin with. They needed a way to increase their incomes using these limited resources. Sustainable agriculture offered a way to do this. They adopted various practices based on indigenous techniques, modified to suit the particular conditions in Baraka, and enriched by technologies developed through formal research. All the techniques are sustainable: they conserve and enhance the environment (improve soil fertility, prevent erosion, etc.), rely on low levels of external inputs, and produce significant yield gains. This has made it easy for the farmers to adopt them.

Here are the major types of technologies used by the Baraka village farmers.

Agroforestry The farmers planted trees to stabilize their terraces, to act as windbreaks, to produce wood for fuel and building, and to yield prunings for use as mulch to smother weeds, protect the soil from erosion, and add organic matter to the soil. The families have each planted more than 30 trees, including *Grevillea*, sesbania and leucaena as part of a living fence around each of their farms. They have also planted woodlots of *Eucalyptus grandis* and cypress as a woodlot for fuel and building poles.

Improving local chickens The farmers already had a few chickens, and plans of upgrading them are underway. The project trained the villagers on poultry management. Each family built a poultry coop near its house and keeps a flock of around 15 hens, which they use for eggs and meat. They sell the chicks and eggs in Nakuru town, 40 km away. They use the poultry manure as fertilizer for their vegetables.

Upgrading of dairy goats The project trained the farmers how to manage dairy goats, and set up a goat-breeding programme. The farmers built housing for their goats and stopped them from grazing freely. The project hired superior bucks from farmers who specialize in goat-breeding to mate with the female goats. This improved the genetic makeup of the kids, boosted milk output and increased meat production. The project trained the farmers how to keep records of their breeding programme.

Drought-tolerant crops Because drought is a problem in some years, it is important that farmers have a fallback in case their main crops fail. The farmers plant drought-tolerant varieties of sweet potatoes and cassava. These crops also provide fodder, and the leaves can be used as vegetables. The sweet potatoes cover the soil with a dense mat of foliage, protecting it against erosion. The project obtained planting materials of improved varieties, organized the farmers to multiply them, and helped them add these crops into their farming practices.

Bananas The College and Kenya Agricultural Research Institute introduced a new way of growing bananas in the area. People already planted bananas, but yields were low because of the poor soil fertility. The project introduced the idea of planting bananas in trenches half-filled

with topsoil mixed with farmyard manure. The trenches are dug close to the homestead, and kitchen waste, animal bedding and leftover animal feeds are thrown into the trench, further increasing the soil fertility. (This is a similar idea to the nine-seeded hole method, page 12.)

Intercropping The farmers used to grow just maize. The project advised them to intercrop maize with beans, then after harvesting the beans, to plant potatoes between the rows of maize. This range of crops makes maximum use of the soil moisture, maintains the soil fertility (the beans fix nitrogen in the soil), reduces erosion, spreads risk if one of the crops fails, and produces good yields that ensure each family has a varied diet and enough to eat. The farmers now obtain certified seed from suppliers, plant early to ensure they avoid drought later in the season, and keep the fields free of weeds.

Crop rotation In addition to intercropping, the farmers also rotate crops in different plots each year – planting maize and beans one season, and then vegetables the next. Like intercropping, rotation improves the soil structure, restores fertility and provides a hedge against the risk of crop failure. It also breaks the life cycle of crop pests and weeds, so producing a healthier crop.

Water harvesting The farmers have dug pans to collect water in the rainy season. They have done this work in groups: a group of five or six farmers has dug a pan on each person's farm in turn. The pans are dug in a shady place to reduce evaporation and are lined with polythene to prevent seepage. The water is used for livestock and to irrigate vegetables in the dry season.

Benefits of integrated agriculture

The people of Baraka village have benefited in many ways from adopting integrated farming.

Food security and income (financial capital) They have improved their food security and varied their diets. Their sales of farm produce have risen to KSh 5600 (€65) per month, an increase of 50%. The children can now go to school: their mothers have enough money to pay school expenses, and they no longer have to go away to search for work.

The villagers started with few financial resources and survived on relief. They have been able to achieve economic and financial stability. Each family can save KSh 100 (€1.15) a month.

Improved environment (natural capital) The improved farming practices conserve the environment: more trees, less erosion, higher soil fertility. The land used to be bare; the slopes were eroded, and low-lying areas were prone to flooding. It is now a pattern of green fields, trees and hedges. Erosion has been minimized, and there is no more flooding.

Greater social capital The formation of the group has strengthened the people's ability to work together: they now help each other, and the adults do some of the farm work for the two sets of orphans. The village now has a strongly organized group, registered with the government. The leaders are elected democratically, and decisions are made by a consensus of all the group members. The group is able to demand services from the government and other organizations.

Greater human capital People have learned new skills and have realized that they are responsible for their environment – and have the power to improve it using their new knowledge and skills. The villagers have gained in confidence – particularly important since most of the family heads are women. All of the women attend adult education classes run by Mtakatifu Clara Mwangaza. Baraka Agricultural College linked the village to the Department of Adult Education, where they learn to read, write and do sums. The children now go to school, so have hope for their future.

Promoting and hindering factors

Two main factors have contributed to the success of the Baraka villagers:

- The group is cohesive and well organized. The members are open to new ideas and strongly motivated to improve their lives.
- The College has been able to marshal a range of services to help the villagers. The training has been well implemented, the development worker highly motivated and effective, and the backup support well organized.

Several factors hinder the adoption of sustainable agriculture:

- The intervention has required a lot of resources: money, time, effort and management on the part of the College and the various other organizations involved. Especially in the first two years, the community relied heavily on inputs from the College.
- Unpredictable weather – drought or heavy rain – make it difficult to plan and implement activities. Farmers and staff may be discouraged by a crop failure, so reject a technology that performs well under normal conditions. Sustainable agriculture offers a solution to this problem: the farmers plant drought-resistant crops such as cassava and sweet potato to tide them over in case of drought.
- Integrated agriculture is labour intensive. The various crops and livestock all take work, and the farmers have had to employ casual labourers from other villages to help them (rather than relying on their children, who are now at school, to do the work).
- The process takes a long time before the villagers realize the full benefits.
- Existing agricultural policies on trade and economic integration tend to work to the disadvantage of small-scale farmers.

Scaling up

All 26 families in Baraka village have adopted sustainable agricultural practices. They can grow enough food for themselves and even have surplus for sale.

The College community workers arranged demonstrations of the various technologies in nearby villages, and a field day at Mtakatifu Clara Mwangaza. They invited people from elsewhere to Baraka village to see how the technologies were working in practice. Most of the people who came to these occasions were women. Back home, many have adopted some of the practices. A total of 120 households in other villages have started using techniques such as drought-resistant crops, intercropping, agroforestry and banana planting. Five nearby schools have planted trees in their compounds, and one has started a tree nursery to sell seedlings.

The College's project has allocated adequate funds to support these scaling-up activities. Even though the project has phased out of Baraka village, the College's outreach programme continues to support and facilitate activities such as demonstrations and field days.

Many people from outside have heard about the Baraka villagers' success story. The District Officer of Lare Division has visited the village and has seen the farmers' success for himself. So have the chiefs of all the Locations within the Division. These officials have informed people in their areas about Baraka village, and urge them to copy its successes. The government has even repaired the roads to Baraka village, making it easy for people to visit – as well as for the villagers to transport their produce.

Numerous visitors from the development agencies which support the College have visited Baraka village. The College uses the village as a site for training for its Kenyan and international students. The farmers of Baraka are proud to show off what they have achieved, and the steady stream of visitors further raises the profile of the village in the surrounding area.

The College has produced pamphlets, brochures and newspaper supplements about its work in Baraka village and its areas of operation. These works feature prominently on the College's website. The College also participates in exhibitions, for example at the Nakuru Agricultural Show, and national and international-level exhibitions. It invites the villagers to participate in workshops to discuss issues related to farming and rural development, and to the College during field days or functions such as graduation ceremonies.

Lessons

Importance of facilitation Intensive, high-quality extension facilitation, backed up by strong support from technical services such as research and development agencies, can make a real difference to people's lives.

Drawing on other resources Baraka Agricultural College did not try to do everything itself. It drew on the resources of other organizations, coordinated and managed their inputs in collaboration with the villagers. The combination of resources, with each organization contributing its own area of expertise, was an important factor in the project's success.

Participation The participatory approach has been vital. The farmers have had an opportunity to try out activities they are comfortable doing, with minimal external support. The approach has also given the farmers enough confidence to venture into activities they feel are appropriate, given the resources they have.

Appropriate technology for sustainability Sustainability can be achieved on a small piece of land by poor households using the integrated approach. This is possible only appropriate technologies are chosen.

Working together Social cohesion contributes to the success of a practice and its sustainability. Success breeds success: a group that is able to achieve results becomes a stronger and more coherent in the process.

Success breeds imitators If a technology is successful, others will be ready to copy it. But that is often not enough. It may be necessary to promote it through demonstrations, field days, working through the government hierarchy, networking with other organizations,

and so on. It is worth putting a substantial amount of effort into a successful project if it can be used as a model for others to copy. The success of the Baraka villagers is visible far beyond the village boundaries itself, and is influencing development interventions throughout Kenya and beyond.

From handouts to self-help Initially, the College provided most of the inputs to the villagers for free. In the later stages of the project, however, cost-sharing became important. The villagers have come to accept the need to bear part of the cost of interventions they benefit from, and because they pay for them, they gain a sense of ownership and responsibility for them.

More information: The Principal, Baraka Agricultural College, www.sustainableag.org

The work of Baraka Agricultural College is supported in part by Misereor.
www.misereor.de

Days of hunger are gone: Groundnuts in Kuna village

*Agriculture and Environment Programme,
Catholic Diocese of Homa Bay, Kenya*



WELCOME TO THE KUNA Seed Fair! It's 10 o'clock in the morning, and the farmers are coming into the field. Some are wheeling bicycles; others are carrying baskets and bags. Twenty men and women are already there. Those who arrived first have already reserved the best places in the shade. They have laid out sisal sacks on the ground and have piled seeds on them. There is more seed in baskets and plastic bags. White maize on the cob. Round grains of red and brown sorghum. Brown millet. Red beans, white beans, brown beans, black beans. Dried tomato seeds. Green sweet potato vines. Tiny black seeds of kale and other leafy vegetables.

And there's the groundnuts. A crowd is already forming around the farmers who have brought brown groundnut seeds – the pride of Kuna.

The farmers are checking the seed – looking at the quality, comparing prices, haggling with the sellers, asking how to grow the crops. People who have brought vegetable seed trade them for millet or sorghum. They visit stalls set up by seed dealers selling certified varieties of maize and beans.

By the time the fair is over in the afternoon, everyone will have gone away with something to plant when the rains begin in the next month.

Groundnuts: the star of the show

People here in Kuna, in Homa Bay District in Kenya, about 60 km from Lake Victoria, have grown groundnuts for many years. The soil is loose and sandy, the climate is right, and people eat the nuts raw, boiled or as relish with the staple diet of maize and sweet potatoes. But yields used to be low. The local varieties grew slowly, taking 5 months to mature. They were susceptible to rosette virus, a disease that attacks the leaves and reduces the number and size of the pods. The farmers grew groundnuts scattered between their maize plants; the maize shaded the groundnut and reduced the yield. It was hard to weed the fields because the crops were not in rows. Sometimes farmers could harvest less than 200 kg per acre (500 kg/ha). If the rain failed, the families would have to eat all their groundnuts, leaving no seeds for the next season.

Things are different now. The farmers of Kuna now plant rows of improved groundnut varieties in rotation with maize. The new varieties mature in only 2.5–3 months, so it is possible to get two crops a season, as well as a crop of maize or sorghum. Weeding between the rows is easier – but is not a big problem anyway because the groundnuts cover the soil



Figure 9 *The farmers of Kuna used to grow groundnuts scattered throughout their maize fields. The result: low yields*

and smother most of the weeds. The new varieties are resistant against rosette virus. The farmers do not use expensive artificial fertilizer: they apply decomposed farmyard manure or compost to their fields to increase the soil fertility. They plant the crops along the contour and have left grass strips to control erosion.

Yields are good. The farmers can harvest 6–10 bags of shelled nuts an acre (1.3–2.2 t/ha), compared to only half that with the old varieties. Harvesting is easier too: the farmers just go through the rows and pull the plants out. The stems of the old varieties were weaker, so the nuts had to be harvested with a hoe. The new varieties grow well even if the rains are poor.

Introducing change to Kuna

How did the farmers of Kuna come to adopt the new varieties – along with all these other changes?

The Catholic Diocese of Homa Bay knew that the people of Kuna people had difficulty feeding themselves. The Diocese's Agriculture and Environment Programme (AEP) has promoted agroforestry and food production in the village since 1997. During focus group discussions for an evaluation of AEP's work in 2000, local people said that growing groundnuts might be a good way to make money.

AEP held participatory appraisals in Kuna and several other villages in 2001. Ministry of Agriculture extension staff, and researchers from the Kenya Agricultural Research Institute and ICRISAT (an international research institute) were also involved in this exercise. The

Box 12 The Catholic Diocese of Homa Bay's Agriculture and Environment Programme

AEP's goal is to improve food security and income among small-scale farmers in the Diocese of Homa Bay. The programme operates in five administrative districts in Southern Nyanza, serving 10,000 households. The main components of the programme are sustainable agriculture (especially organic farming), livestock, marketing, post-harvest grain storage, and rural financing.

AEP uses existing self-help village groups as an entry point. AEP asks them to divide into smaller "solidarity groups" to make work easier. The solidarity groups consist of 5–10 farmers, and they meet once a week. Once a month, all the solidarity groups from a village hold a joint meeting.

AEP has 12 field extension personnel, who assist resource people within each community. These resource people are farmers chosen by the solidarity groups. AEP trains them in the necessary technical and leadership skills. They provide the link between the solidarity groups and AEP.

villagers discussed problems in groundnut production and possible solutions. The researchers and villagers realized that the drop in groundnut yields was because of diseased seeds and poor varieties. The farmers did not have any improved varieties, and did not know a better way to grow the crop.

Everyone – scientists and villagers alike – agreed that Kuna would be an ideal place to try to improve the production of groundnuts.

Testing varieties

One of the things decided during the participatory appraisal was to test some improved varieties of groundnuts. The researchers provided seeds of five varieties and showed the farmers how to lay out test plots. Two farmers – a man and a woman – allocated some land for the trials. The solidarity groups (Box 12) provided seed of the local variety for comparison, and did the land preparation, planting, weeding and other farm work. They also checked for disease and measured the yield. AEP organized the farmers, monitored the trials and wrote up the results. AEP and Ministry extension staff trained the farmers on improved groundnut production. Two sets of trials were conducted, in the long and the short rainy seasons.

After the second set of trials, the farmers selected the two best varieties based on their yield, drought resistance and disease tolerance. The two top varieties were called ICGV 12991 and ICGV 12988.

Seed multiplication

The trials created a lot of interest. The farmers were keen to get hold of more seed to plant on their own farms. AEP and the solidarity groups decided how to produce more seed.

Two farmers agreed to grow the new varieties and produce seed. AEP gave them each 5 kg of seed. In the first season, the two farmers planted half an acre (0.2 ha) of the new varie-

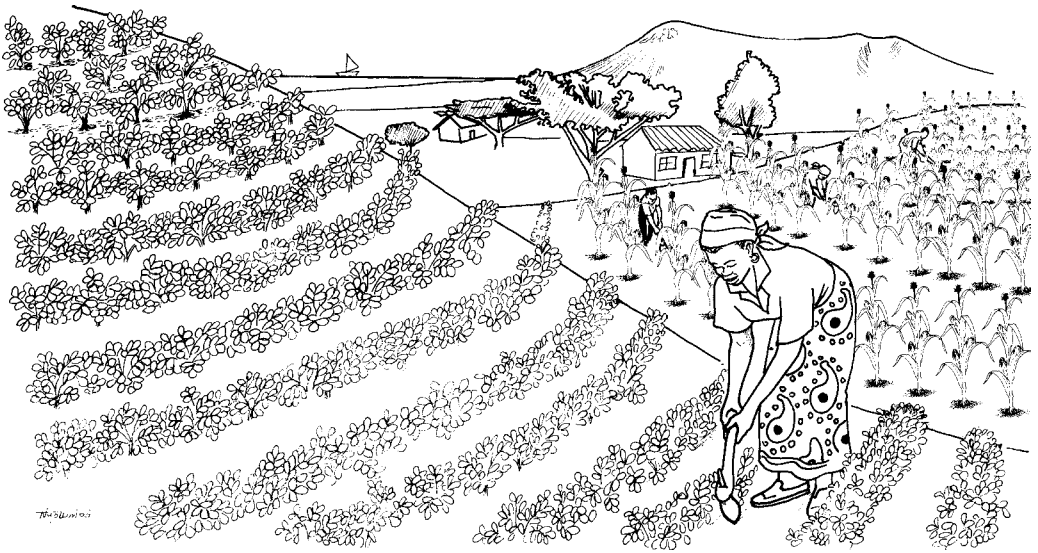


Figure 10 Rotating pure stands of maize and groundnuts produces better yields

ties and harvested 300 kg of seed. They gave 10 kg back to AEP, kept some so they could continue multiplying seed themselves, and sold the rest at seed fairs in Kuna and nearby. AEP organized the seed fairs just before planting time to enable farmers to exchange seed and acquire improved varieties. Some of the farmers who bought seed went on to multiply seed in the same way.

AEP gave 10 kg of seed to two new farmers in Kuna in the next season. It did the same for another two seasons, until all the farmers in Kuna could get the improved varieties.

Rotating crops

By 2003, 180 farmers in Kuna had started producing improved groundnuts in large volumes. AEP also trained the farmers on how to manage various crops. *Striga*, a parasitic weed that attacks maize, is a problem if maize is grown season after season on the same land. To break the life cycle of the *Striga* and control this weed, it was necessary to rotate maize with another crop. The new groundnut varieties were ideal: they enrich the soil because they fix nitrogen, and the residues could be either fed to livestock (to produce manure) or ploughed back into the soil.

The farmers' plots changed from a mix of randomly planted maize and groundnuts to pure green rows of groundnuts, followed by maize in the next season. Pure stands of both crops yielded more.

After harvest, the farmers leave the groundnuts to dry in the field, then 2 days later they detach the pods from the plants, dry them and put them into sacks. They shell them when they need them to eat or to sell.

Box 13 “The days of hunger are gone”

“I can feed my children, pay school fees and buy clothes. I no longer have to bother my in-laws to help make ends meet. I have built a house and bought animals. The days of hunger are gone – thanks to groundnuts.”

—Mama Esther, a widow in Kuna village

Creating the market link

Marketing was of the problems identified during the participatory appraisal. Before, the farmers – mainly women – took to the market the little surplus they had to sell. The women had to carry the sacks of groundnuts all the way to the market, then wait all day in hope of finding a buyer. They never knew how much they could get for their produce. Sometimes they would have to go back to the market week after week in order to sell all their produce.

AEP and the other partners did a market survey on groundnuts in 2003. This identified some new marketing outlets: exporters and traders from Nairobi and Kisumu, as well as traders in the local markets.

As a result of this survey, AEP helped the farmers form a “producer marketing group” in Kuna, along with several other such groups elsewhere in the district. Each marketing group is composed of the same farmers who are members of several solidarity groups. It is managed by a committee elected every year by the farmer members. The marketing group has its own rules and regulations. The farmers sell their produce to the marketing group, which can use its extra bargaining power to negotiate better prices with buyers. The farmers now have a reliable market, and no longer need to go individually to the market to sell their produce. Farmers get cash immediately, all at one time.

The marketing group’s committee is responsible for buying and selling the groundnuts. They check on market prices, so they know how much they can pay for groundnuts the group buys from its members. They do not receive a salary, but they get their expenses paid out of the sale proceeds. If the marketing group makes a profit, it banks the money with the Bengi Investment Group, a community-managed bank which AEP initiated together with the farmers.

AEP started to train the Kuna marketing group’s committee to develop a production plan – how much to produce, at what time, and how to match the market demand.

By 2004, the farmers of Kuna were mass-producing groundnuts. At the end of that season the marketing group sold 15 tons of groundnuts to an exporter from Nairobi. The demand for seed and grain of the new varieties is very high, and the marketing group has regular orders from NGOs, processors, local markets and other farmers. Catholic Relief Services Kenya, one of AEP’s funding agencies, has created a link with its other operations in Africa, and Kuna farmers now sell groundnuts to buyers in Sudan and Tanzania. The Legume Project, a big project in Western and Eastern Kenya implemented by Technoserve, an American NGO, is interested in buying seed.

There are currently no certified groundnut seeds in the Kenyan market, but the Kuna producers are becoming widely known for producing high-quality seed. One kilogram of seed

fetches KSh 100 (€1.15), while the same amount of grain sells for KSh 70 (€0.80). Many of the Kuna farmers select their best output and sell it as seed. AEP has trained them how to do this.

Banking on success

The farmers now earn enough to save. They can deposit it with the Kuna Bengi Investment Group. All the solidarity groups are members of this bank, and can save their money as groups or as individuals. Every member is supposed to save at least KSh 50 (€0.60) every month.

In times of need, the farmers now have a chance to get a loan. The marketing group also borrows money to buy groundnuts from the farmers that it sells to traders.

The marketing group has used a loan from the bank to buy a manually operated shelling machine from a local blacksmith (who was trained by AEP). The farmers can now shell their groundnuts for a small fee, which is paid into the community bank.

Reaping the benefits

The farmers' income has increased dramatically. They can buy meat or fish, which few could not afford before. They sell groundnuts to buy maize if they need to. Almost everyone in Kuna who grows groundnuts now can eat 3–4 times a day instead of once or twice. There is now no "hungry season" in Kuna.

The farmers can buy farm implements and oxen to pull ploughs, and can build new houses. They can invest in education for their children. They can buy medicine. Some have bought goats, cows, sheep and chickens. Some farmers have started small businesses: kiosks, food stalls and butcheries.

Their increased purchasing power means people can contribute to the community's social amenities and institutions. Parents have contributed towards building a primary school for the village. The growing local economy has spurred the government into action: it is building a road to the village. The local government is short of money, but the villagers managed to convince officials they needed a road so they could sell their groundnuts. The government wins too: it gets more income from its levy on sales in the market.

As a traditional staple food, groundnuts used to be a women's crop. They are now a highly-valued cash crop, and the women's income has increased. The men have got involved in growing groundnuts – and they have come to appreciate the work the women did. The women growers have become role models, and they now play a big part in leading the various groups, from the solidarity groups to the community bank. Women hold treasurer's posts in all the solidarity groups, the marketing group and the bank, and are members of the marketing group's and bank's executive committees. They have a say in things that men used to control exclusively: things like boreholes and handpumps, sheep and goats, credit, the use of compost and manure, and what to do with the harvest. The men still control what to do with the land, managing cattle and heavy implements like ploughs.

Scaling up

Almost all the farmers in Kuna now grow the improved varieties of groundnuts. AEP started with one solidarity group with 20 members in 2001; by 2006, the number had grown to 32 groups with 300 members. The marketing group now has 150 members, and the bank 220. Farmers from neighbouring areas now buy seeds from Kuna farmers.

AEP has established links between Kuna and Ndhiwa division, about 10 km away. An AEP-supported group in Ndhiwa has bought a flour mill. It buys groundnuts from Kuna to mix with locally produced orange-fleshed sweet potatoes, and make flour. This can be used to make a nutritious porridge that is rich in vitamin A and is especially good for children and HIV/AIDS victims. This has created an additional market for farmers in Kuna and Ndhiwa, and for other farmers producing groundnuts and sweet potatoes elsewhere.

Demand for groundnuts is so high that the Kuna farmers are interested in persuading others to join them in growing the crop. They want the Kuna area to be known throughout Kenya for its groundnuts. They use chiefs' *barazas* (village gatherings), social gatherings, churches and other community meetings to reach more farmers.

The exchange of groundnut seed has been fostered through seed fairs and exhibitions, field days, and farmer-to-farmer visits among the solidarity groups. AEP coordinates and supports these efforts. Farmers from various programme sites of AEP visit Kuna, and as a result have spontaneously taken up growing the new varieties – even in areas not targeted by AEP.

Kuna has no electricity, so it is not possible to do much processing there. AEP is promoting processing in other villages which are into improved groundnut production. Products include peanut butter and roasted nuts. AEP has bought a peanut butter mill for training and demonstration, along with the materials for packaging. A solidarity group operates this machine, produces and sells peanut butter, and train other farmers. A machine costs about KSh 50,000 (€576), so is within the reach of a farmer group that is able to access microcredit. Three solidarity groups have bought machines and have taken up peanut butter production. They can earn almost twice as much from the butter as from the grain. Another group has taken up roasting and packaging groundnuts.

AEP has created a link to the Kenya Bureau of Standards (the body responsible for quality control and certification in Kenya) to test and certify processed groundnuts produced by farmer groups in Homa Bay. The Bureau has approved the quality of the peanut butter, roasted groundnuts and raw groundnuts, and is due to certify the products in the near future. AEP has developed a label for the groundnut products, and intends to register it and acquire



Figure 11 Farmer groups are buying machines to make peanut butter

a barcode so supermarkets will sell it. When all the procedures have been finalized, AEP plans to allow the farmers to use the label and set up a system to maintain the product quality.

Networking

AEP has a very good network in the villages and with community leaders.

The programme collaborates closely with the government. AEP staff link the farmers' groups to special government funds that they can use to pay for training, buy seed, and other needs. The groups decided what to do with the money, under the supervision of the government officials and AEP.

AEP actively participates in government committees. Promoting organic production is a strong part of AEP's agenda. Through its participation in the committees it has established a joint demonstration plot on organic farming. Interest in organic farming is growing in the five districts AEP serves.

The Kenya Agricultural Research Institute and ICRISAT are key partners for AEP. The two research institutes sell "basic seed" to the Kuna marketing group, which sells it to farmers the group has chosen to multiply the seed. This basic seed is necessary to maintain the seed quality and genetic potential of the groundnut varieties.

AEP also cooperates with other NGOs and dioceses throughout Kenya. They buy seed from the Kuna farmers, and organize visits to Kuna by farmers from their localities.

Groundnuts are just one of the development activities that AEP supports in Kuna. Others include microfinance (the bank), and the production of nutritious food such as oranges and porridge (like that produced in Ndhiwa) for HIV/AIDS victims.

The Kuna farmers would make even more money if they could package and label their groundnut seed. But they are not allowed to: the seed has not been approved by the Kenya Plant Health Inspectorate Service (KEPHIS). This service must follow strict rules governing seed production – which the Kuna farmers cannot meet. The rules are biased towards large farms: the groundnuts must be grown a long way from any other groundnut varieties, and KEPHIS charges a hefty fee that even the group cannot afford. The government so far has not developed rules that would make it easier for communities to produce certified seed. AEP is lobbying for a change in these rules.

Lessons

Participation It is very important to involve the farmers in choosing technologies, and in managing and evaluating on-farm trials. This is necessary if the farmers are to feel that the project is their own, and that they bear a big part of the responsibility for it.

Farmer groups The solidarity groups were AEP's entry point to promote the groundnut technology. The producer marketing groups were vital for marketing, and the bank provided financial support. The solidarity groups were formed from existing self-help groups that the farmers had formed themselves – so were already well organized and coherent. It is important to invest in building the capability of groups in areas such as financial management, savings and credit and marketing.

Markets When AEP realized that groundnut production in Kuna was taking off, it did a market survey to find where the farmers could sell their product. It identified buyers who were willing to pay a good price, then did what was necessary to link the farmers to the market. The high demand for groundnuts has stimulated farmers to adopt the technology, building up a critical mass of producers in the area.

Diversification The new varieties have small seeds, which can be used for products such as peanut butter and relish. But for peanut snacks, the high-value end of the market, consumers demand the opposite – big seeds. The farmers of Kuna should spread their risk and seek to penetrate new market niches by increasing the range of varieties and other crops they grow.

Support from other institutions AEP's linkages with research institutions enabled it to get improved technologies that the farmers could test and adopt. AEP developed linkages with exporters and traders, ensuring that the farmers had a market for their produce.

Horizontal transfer of information The technology came originally from the research institutions, but once it had been adopted by a few farmers in Kuna, transfer was mainly horizontal, from farmer to farmer. AEP promoted this exchange by sponsoring farmer-to-farmer visits and group exchange visits. Such approaches are typical of sustainable interventions, and contribute to the successful uptake of innovations.

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